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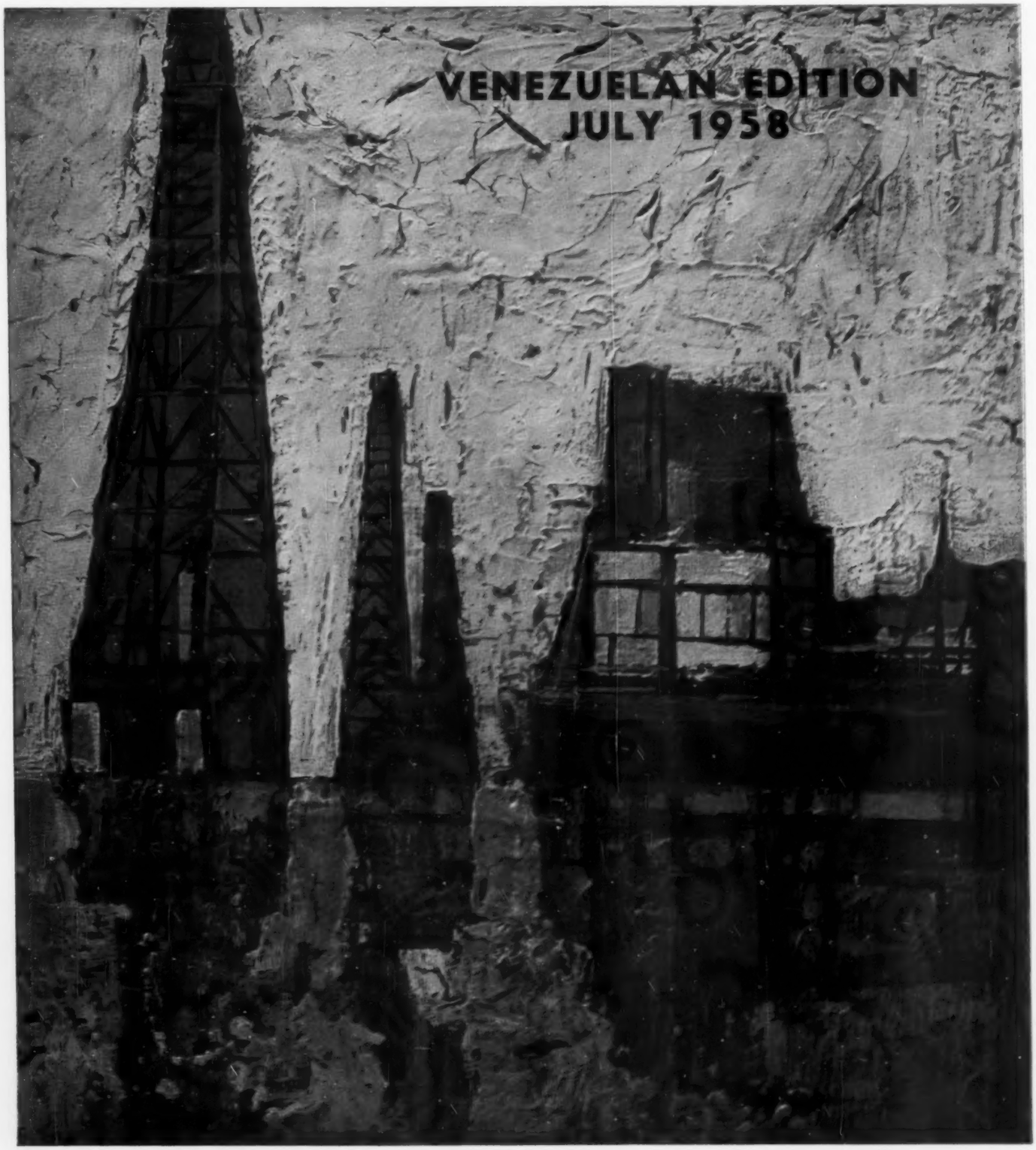

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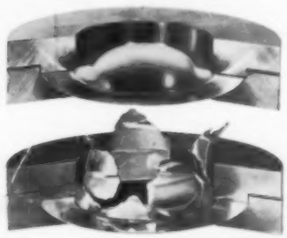

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THIS MONTH'S COVER

Instalaciones en el Lago de Maracaibo. Por Nicola Simbari para El Farol, revista del Creole Petroleum Corp.

Installations in Lake Maracaibo. By Nicola Simbari for El Farol, house magazine of Creole Petroleum Corp.

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By Joseph B. Huttlinger

To Fight Price-Hike Charges

The 29 American oil companies accused of agreeing to hike the price of crude and of gasoline in January 1957 have given clear signs they plan a fight in the courts. Most of the companies—the bulk of the majors operating east of the Rockies—have been issuing statements of their innocence since the indictment was returned, May 29, by a federal grand jury. Therefore, it may be a long time before the outcome is known, for a court trial can take many years. Whether the government plans to handle the proceeding as a single unit or to break it up into smaller actions is to be seen. Further, it is not known whether the government plans further court actions in connection with crude-oil and gasoline prices, but further action would come as no surprise.

Several of the companies have complained, in statements, about the "uncertainties" of the antitrust laws, as they try to obey them. This is a tipoff to what may be one line of defense by the companies. The federal grand jury which was called to study oil and the antitrust laws, March 4, 1957, made a single charge in a six-page indictment listing all the companies. The grand-jury action came on almost the final day of life for the jury, which extends only 18 months.

Among the companies named were 18 engaged in crude-oil producing, buying and selling, and gasoline marketing—as follows: Arkansas Fuel Oil Corp., Shreveport, La.; Ashland Oil & Refining, Ashland, Ky.; Atlantic Refining, Philadelphia; Carter Oil Co., Tulsa; Cities Service Oil Co., Bartlesville, Okla.; Continental Oil, Houston; D-X Sunray Oil Co., Tulsa; Gulf Oil Corp., Pittsburgh; Humble Oil & Refining, Houston; Magnolia Petroleum Co., Dallas; Monsanto Chemical Co., St. Louis; Ohio Oil Co., Findlay, Ohio; Phillips Petroleum Co., Bartlesville; Shell Oil Co., New York; Skelly Oil Co., Tulsa; Sun Oil Co., Philadelphia; The Texas Co., New York; Tidewater Oil Co., San Francisco.

Three oil purchasing and buying corporations named were: Indiana Oil Purchasing Co., Tulsa; Sinclair Crude Oil Co., Tulsa; Sohio Petroleum Co., Cleveland.

Also named in separate paragraphs were: Esso Standard Oil Co., crude-oil buyer and gasoline marketer; Sinclair Refining Co., New York, gasoline marketer; Socony Mobil Oil Co., New York, gasoline marketer, and owner of Magnolia; Standard Oil Co. (Indiana), Chicago, gasoline marketer and owner of Indiana Oil Purchasing Co.; Standard Oil Co. (Ohio), Cleveland, gasoline marketer, and owner of Sohio; Cities Service Co.; Sinclair Oil Corp.; Standard Oil Co. (N.J.).

Pipeline

The indictment said the "affected market" where the price rises took place was the District of Columbia and all states in the USA except California, Oregon, Washington, Nevada, and Arizona.

The indictment was presented in open court to US District Judge Albert Bryan, Alexandria, Va., of the Eastern District of Virginia. Next step expected was for Judge Bryan to set a date for arraignment. Oil companies are expected to file motions for dismissal; and, finally, briefs would be filed.

DJ Probe Follows Rise

A general rise in the price of crude oil began at the end of 1956—shortly after the world oil shortage stemming from the Suez Canal shutdown—as Humble raised the price 35 cents a barrel. During the next few days and weeks, the price rise became general, and gasoline and other product prices rose as well. Since then, some—at least—of the rise in product prices has failed to hold.

Paul E. Hadlick, counsel for National Oil Marketers Assn., was one of the first to ask DJ to study the matter in a letter of January 1, 1957. When senators began investigating—as they all do general oil price rises—DJ began the grand-jury investigation which, in 14 months, heard from more than 300 oil men behind closed doors.

While the indictment is criminal, no individuals are named; so the prospect of jail sentences is not in sight at this time—even if the courts agree the indictment is justified. The companies could be fined, however, up to $50,000 each.

During the entire grand-jury study, emphasis was on pricing east of the Rockies—apparently because the DJ already has its hands full with the majors on the West Coast in a case which goes to trial in the near future. Further, officials of the West Coast companies could hardly be expected to talk freely before a new grand jury at Alexandria while trying to defend themselves in another action in the courts.

The library full of facts gathered before the grand jury can be used by the DJ, it is said, in filing briefs to back up the grand-jury charges. Or they could be used in other suits against oil companies. At this time, however, it is understood DJ officials have no plans for filing another action.

Officials of the American Petroleum Institute and other associations also were called before the federal grand jury; and letters of oil-company officials with oil jobber and oil-producing association officials were asked by the jurors under subpoena.

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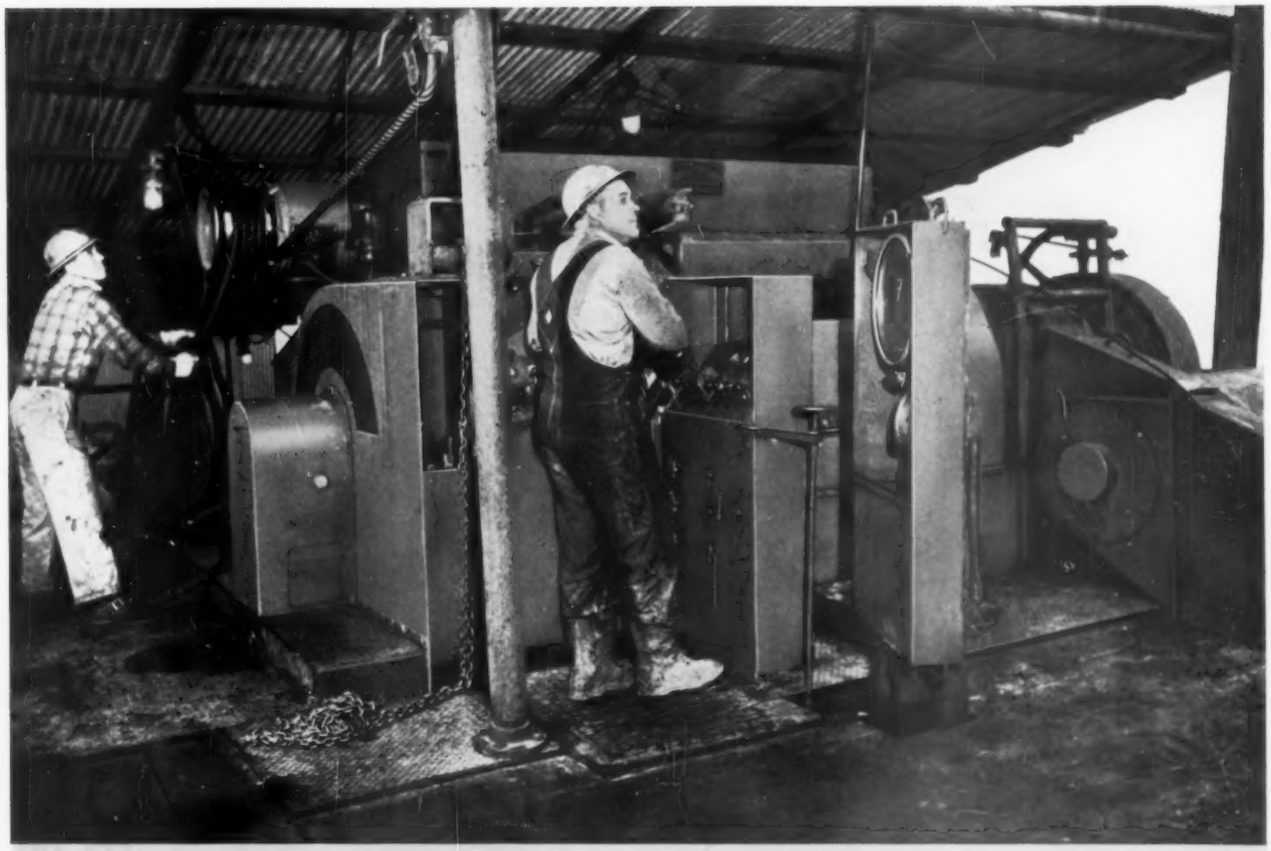

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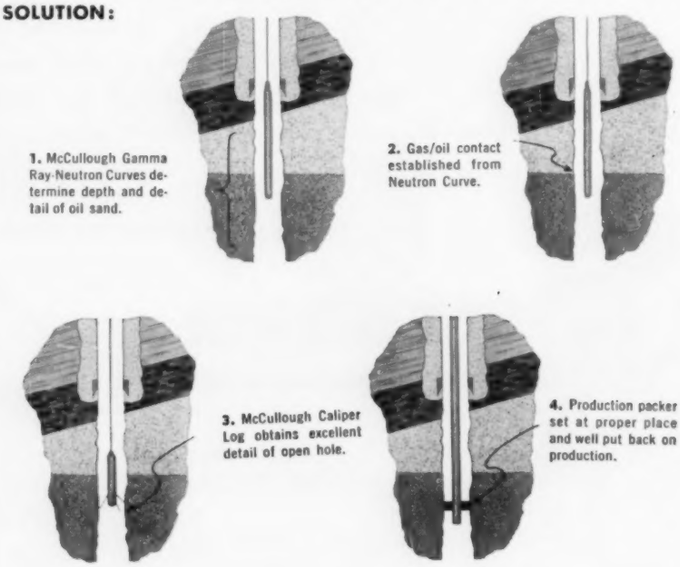

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3. McCullough Caliper Log obtains excellent detail of open hole.
4. Production packer set at proper place and well put back on production.

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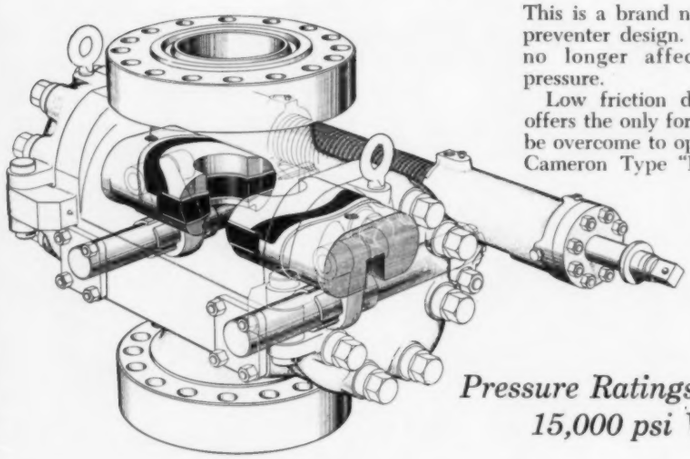

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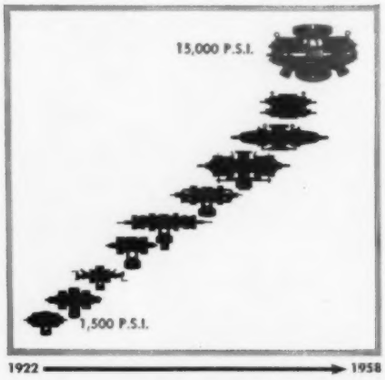

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CANADIAN NOTES

Geophysicists To Meet In Canada

Socy. of Exploration Geophysicists has accepted invitation of Canadian Socy. of Exploration Geophysicists to schedule its 32nd international meeting in Calgary, September 1962.

Host To World Power Conference

The technical session of the World Power Conference this year will be held for the first time in Canada. Expected to attract more than 1,000 scientists, engineers, economists, and other experts from some 50 different contries, the meeting will be held at The Queen Elizabeth Hotel, Montreal, September 7 to 11. Delegates also plan to accompany study tours to important Canadian and USA hydro, thermal, and atomic-energy plants—including St. Lawrence Seaway and the atomic reactor at Shippingport, Pa.

Theme of the Canadian sectional meeting will be "Economic Trends in the Production, Transportation, and Utilization of Fuel and Energy"—with presentation of some 150 papers. Under the "production" section, delegates will examine trends in production of hydraulic, thermal, and other forms of energy—including coal, oil, and nuclear.

Under "transportation," economic trends in transportation of fuel and energy by electric transmission, rail, water, pipeline, and other means will be studied.

Proceedings will be conducted both in English and French.

Imperial Expands At Sarnia

Continuing a high level of capital expenditures, Imperial Oil has undertaken a $5,360,000 expansion program at its Sarnia refinery—already the largest in Canada. G. R. McMillin, refinery manager, said the new construction is necessary to meet increasing demands for gasoline and other oil products in Ontario. "Altogether," he said, "Imperial will spend about $36 million this year to enlarge its manufacturing facilities and increase production in refineries across Canada. The expansion will mean a 20% boost in the Sarnia plant's crude refining capacity—to 94,000 b/d from 78,000 b/d.

Work on the project, which has begun, is expected to be completed by the middle of 1959. The program involves additions to distillation and cracking units used in the manufacture of gasoline and other products, as well as improvements to piping, storage, and blending facilities. While no new large units will be built, equipment will be added to permit more intensive use of existing facilities.

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E. D. Brockett (center right), recently appointed president of British American Oil Co. Ltd., makes his initial tour of B-A's Pincher Creek sulfur plant, currently undergoing expansion to meet Trans-Canada pipeline gas contract requirements late this year.

Virginia Hills Pipeline Approved

An application by the Peace River Oil Pipeline Co. Ltd., Calgary, to build a 70-mile line in sizes 6-in., 8-in., and 12-in. from the Virginia Hills area has been approved by the Alberta government department of Mines and Minerals. The line will tie in with the company's existing line from the Sturgeon Lake oil field to the Trans-Mountain pump station at Edson, Alta. Peace River Oil Pipe Line is an affiliate of the British American Oil Co., Hudson's Bay Oil and Gas, Texaco, and Liberal Petroleums, with B-A the operator.

Approval of the line paves the way for two outlets for Virginia-Swan Hills production. Earlier, the government granted a pipeline permit to Federated Petroleums Ltd., subsidiary of the Home Oil Co. Ltd., Calgary, to construct a 125 mile 10¾-in. line to Edmonton refineries. This line will cost approximately $6,500,000.

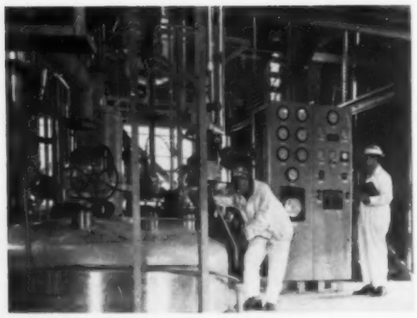
Crude For USA Midwest

Pipeline system of Minnesota Pipe Line Co. will be expanded within a few years for placement of Canadian crude oil in the Chicago market area, according to forecast of Marlin E. Sandlin, president of Woodley Canadian Oil Co., Houston, Texas. He estimated conservatively, Duluth, Chicago, and Michigan areas will represent a market of about 150,000 b/d for all types of Canadian crude within the next decade. Present market for Canadian crude in the northcentral USA stands at approximately 50,000 b/d.

Canadian Pipe For Ontario Lines

More than $3 million will be invested in welded steel pipe and valves by the affiliated team of Northern Ontario Natural Gas Co. Ltd., and Twin City Gas Co. Ltd., which are building natural-gas distribution systems in 34 northern Ontario communities this summer.

A total of 2,507,842 ft of steel pipe of varying sizes—nearly 475 miles—has been purchased by the affiliated companies from Page-Hersey Tubes Ltd., of Toronto, for the companies' construction program this year. The pipe ranges in diameter from 12-in. lengths, which will be used in Northern Ontario's 88-mile lateral pipeline from Porquis Junction to Sudbury to the ¾-in. pipe used in service lines from street mains to customers' homes.



First Canadian plant to produce epoxy-type resins has gone onstream at Montreal East. Shell Oil Co. of Canada built the $1 million plant adjacent to its other chemical manufacturing facilities in that community. A. W. Hutchison, chemical division manager, said capacity of the new plant is sufficient to supply Canada's demands for these relatively new products.

This is interior view of the plant. Operator (L) checks process through a sight glass in the reactor kettle, while another operator records temperature from the control panel at right.

First major forest products industry of Alberta to receive natural gas, Ontario-Minnesota Pulp and Paper Co.'s Kenora mill, is on the line of Northern Ontario Natural Gas Co.'s distribution system. Is is the first of 11 giant pulp and paper plants in northwestern and northern Ontario ultimately to be served by Northern Ontario Natural Gas and its affiliate, Twin City Gas Co. Ltd., under industrial contracts totaling 66,900,000 cu ft gas daily. The Kenora plant has a contracted daily demand of 5,150,000 cu ft of firm and seasonal gas.

New Alberta Trunk Officers

At a meeting of the directors of the Alberta Gas Trunk Line Co. Ltd., May 30, the following officers were elected: A. G. Bailey, president; R. J. Dinning, chairman; George E. Church, first vice president; D. C. Jones, second vice president.

Mr. Bailey succeeds Vernon Taylor of Imperial Oil Ltd. as Trunk Line president.

International Proration Proposed

Efforts are being made at the top government level to work out a three-way deal among Canada, United States, and Venezuela to solve the oil imports problem by agreeing on a plan for proration of crude-oil production to market demand in all producing areas of all three nations. Some change in direction of oil movements would also be involved. Woodley Petroleum is a leading sponsor of the proposal.

Outlet For Canadian Crude

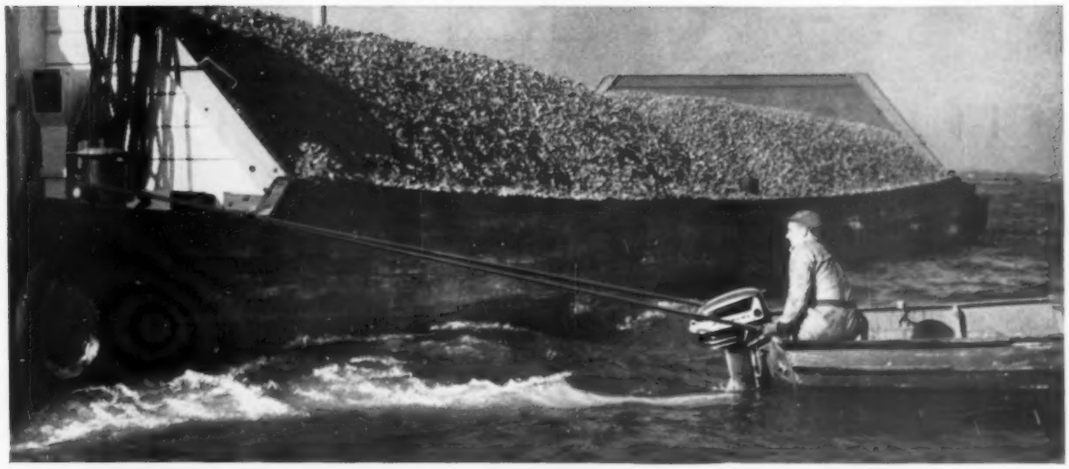
Prime Minister Diefenbaker is expected to call an early meeting of integrated oil-company executives to discuss means of increasing demand for Canadian crude short of building the proposed Alberta-Quebec pipeline.

Oil company heads opposing the new pipeline are expected to propose an early reduction in product imports now averaging around 95,000 b/d; early enlargement of refinery capacity in Ontario permitting discontinuanec of westward movement of products from Quebec into Ontario; elimination of crude imports into Ontario.

On the basis of no inventory change, the Canadian supply and demand picture in the first four months of 1958 is estimated to be about as follows:

	Thousands of Barrels Daily
Production	484
Imports	330
Total new supply	814
Exports	111
Domestic demand	703
Total demand	814

In 1957 Canada exported about 158,000 b/d and imported 404,000 b/d. Domestic output was about 517,000 b/d, including natural-gas liquids.



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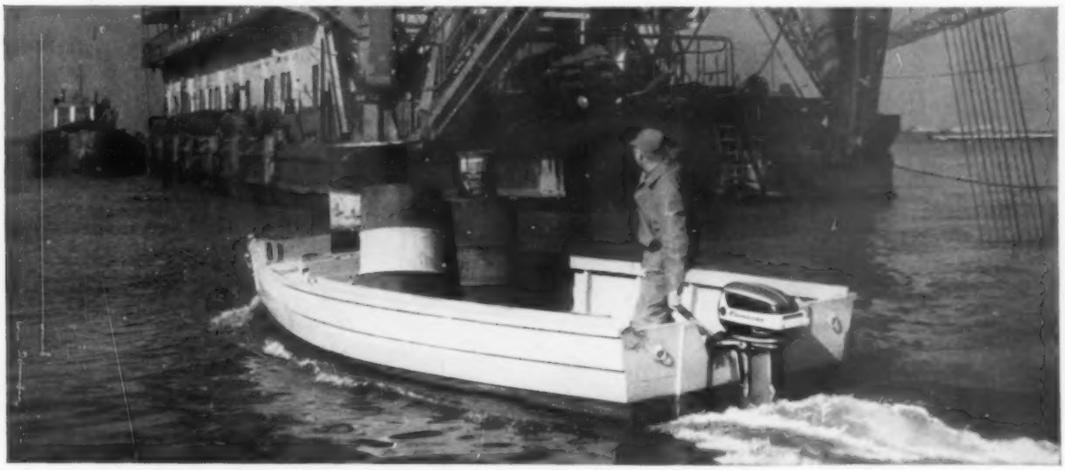

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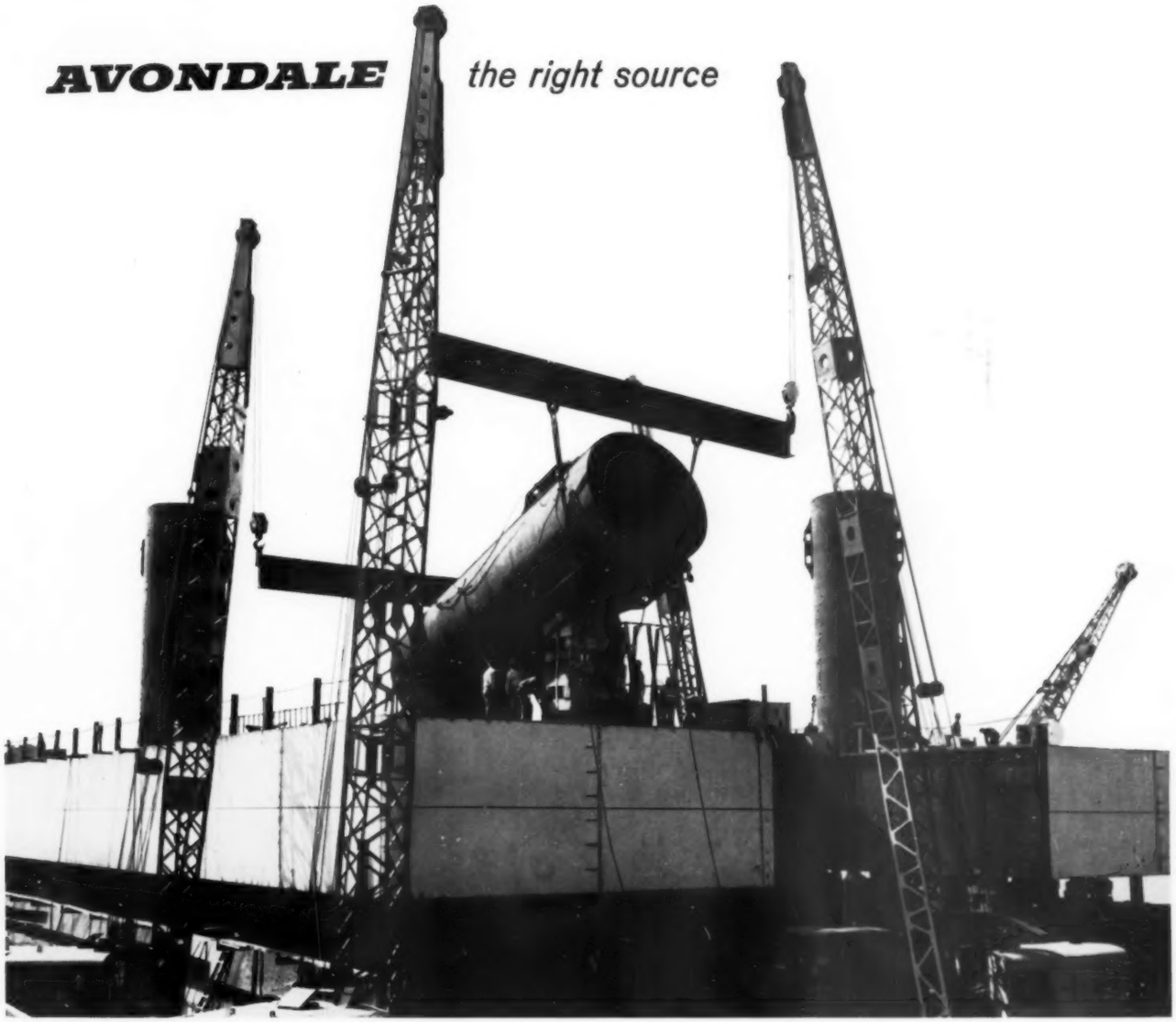

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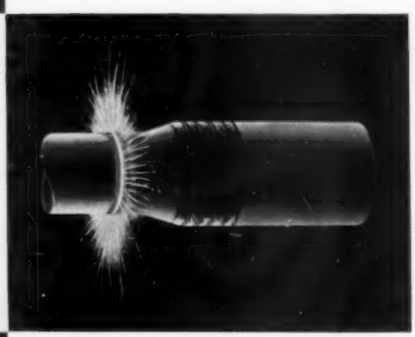

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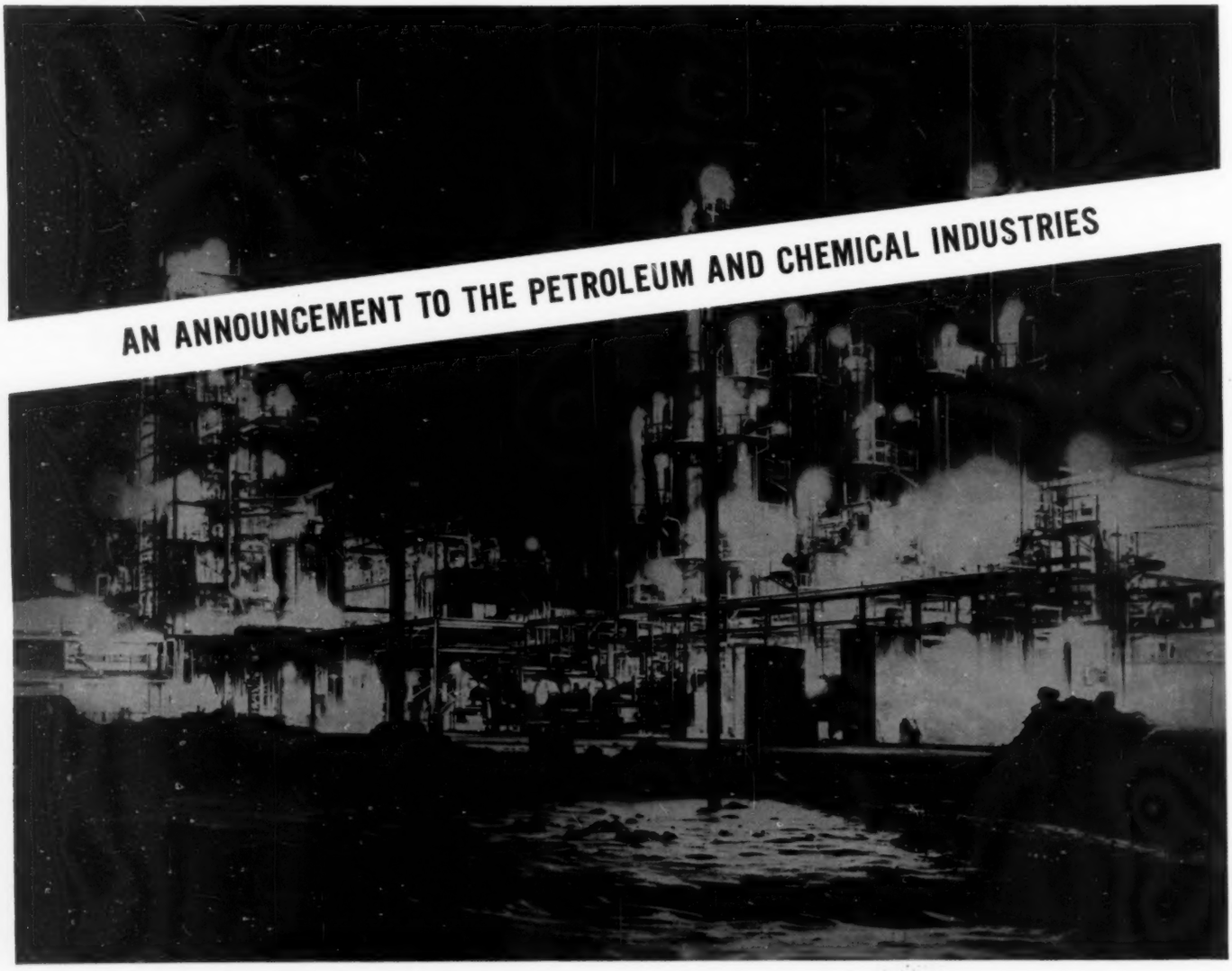

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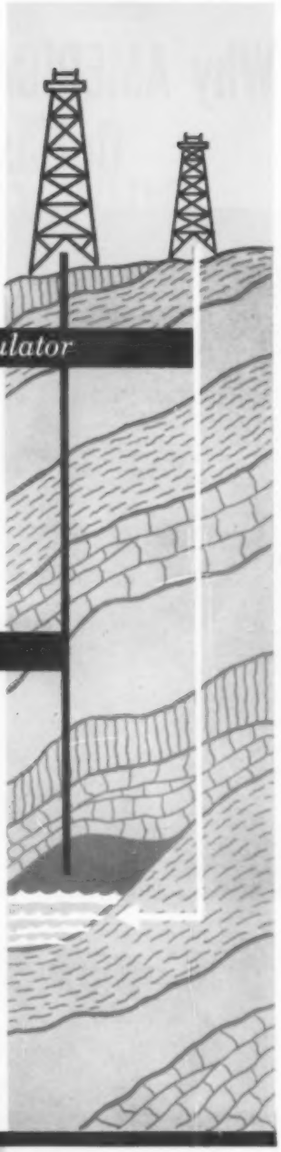

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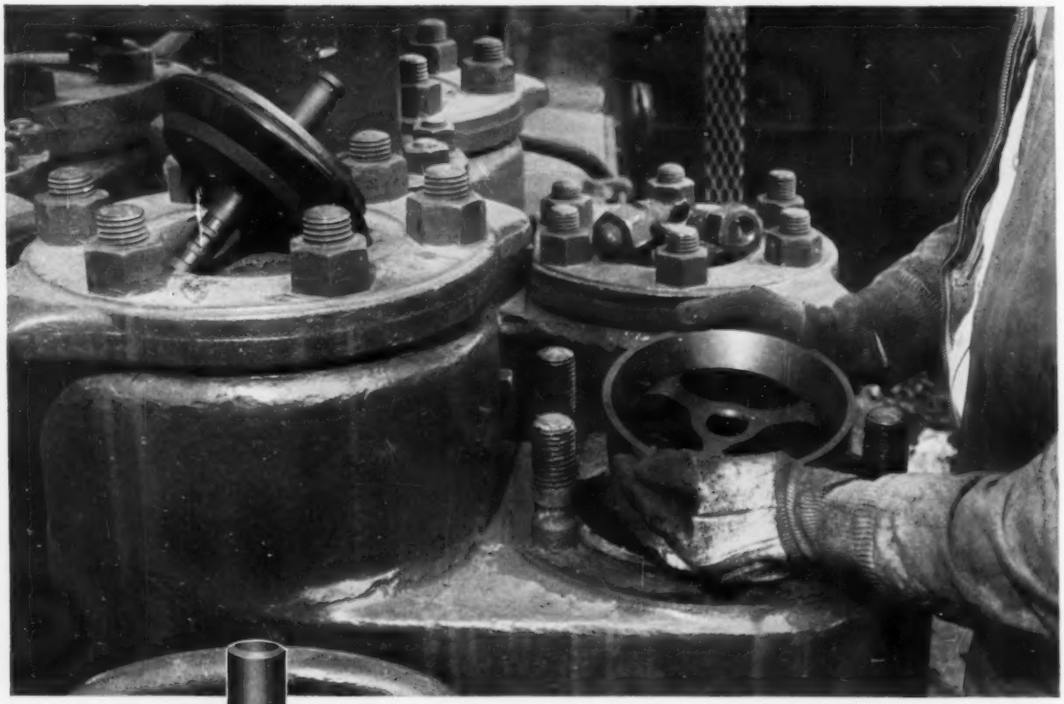

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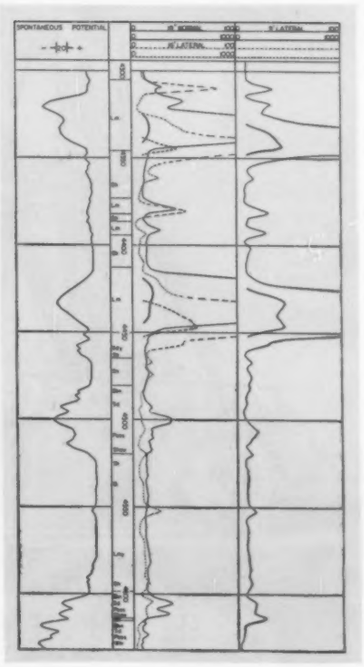

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UOP Cat Cracker helps United increase gasoline yield up to 50% and reduces lower value middle distillates

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United Improves Flexibility And Economics With Fluid Catalytic Cracking Unit

by H. A. Logan Jr.,
President
United Refining Company
Warren, Pennsylvania

On June 23, 1957, United Refining Company completed 55 years in the refining of petroleum products. As auspicious as this occasion may have been, we did not celebrate in the usual sense. Rather, we concerned ourselves with future plans, in which a 2,500 BPSD UOP Fluid Catalytic Cracking unit, on stream May 5, 1957, has a significant part. Indeed, it is a happy feeling for us at United to know that we are going into our 57th year so well equipped for continuing our tradition of service to our customers by providing top quality petroleum products.

Cat Cracker proves best

Early in 1956, we approached Universal Oil Products Company, licensor of petroleum refining processes, for assistance in planning our modernization program. Because of our particular need, UOP suggested the Fluid Catalytic Cracking unit. But before making a final selection, we organized a thorough and complete study of the problem, including all available alternatives, to determine the process that would both allow us to best serve the needs of our customers with high-quality products, and to do so at reasonable initial investment and operating costs. As a result of this study, we found that the UOP Cat Cracker was the most satisfactory choice for us because the process afforded United a greater flexibility in charge stocks, better quality of products, and lower investment costs. With the addition of the UOP Fluid Catalytic Cracking unit, our refinery is equipped to process a much larger volume of Mid-Continent crude, which will account for the major proportion

H. A. Logan Jr.

of our light products. Thus, we now have a much broader base of operations, a greater flexibility, and a more favorable economic position than before.

30% to 50% yield increase

As is true with other refiners, we are vitally concerned with yield. Since the UOP Fluid Catalytic Cracking unit was placed on stream, our gasoline yield has increased from 30% to 50% with a corresponding reduction in the production of lower value middle distillates. The cat cracker has provided us with a greatly improved octane potential. Today we are marketing premium and regular gasolines with octane ratings which rank among the highest in the country. As a plus feature, the UOP Fluid Catalytic Cracking unit has given us an improved realization for the middle of the barrel. We are producing one new product from the cat cracker, LPG, that we have not previously marketed.

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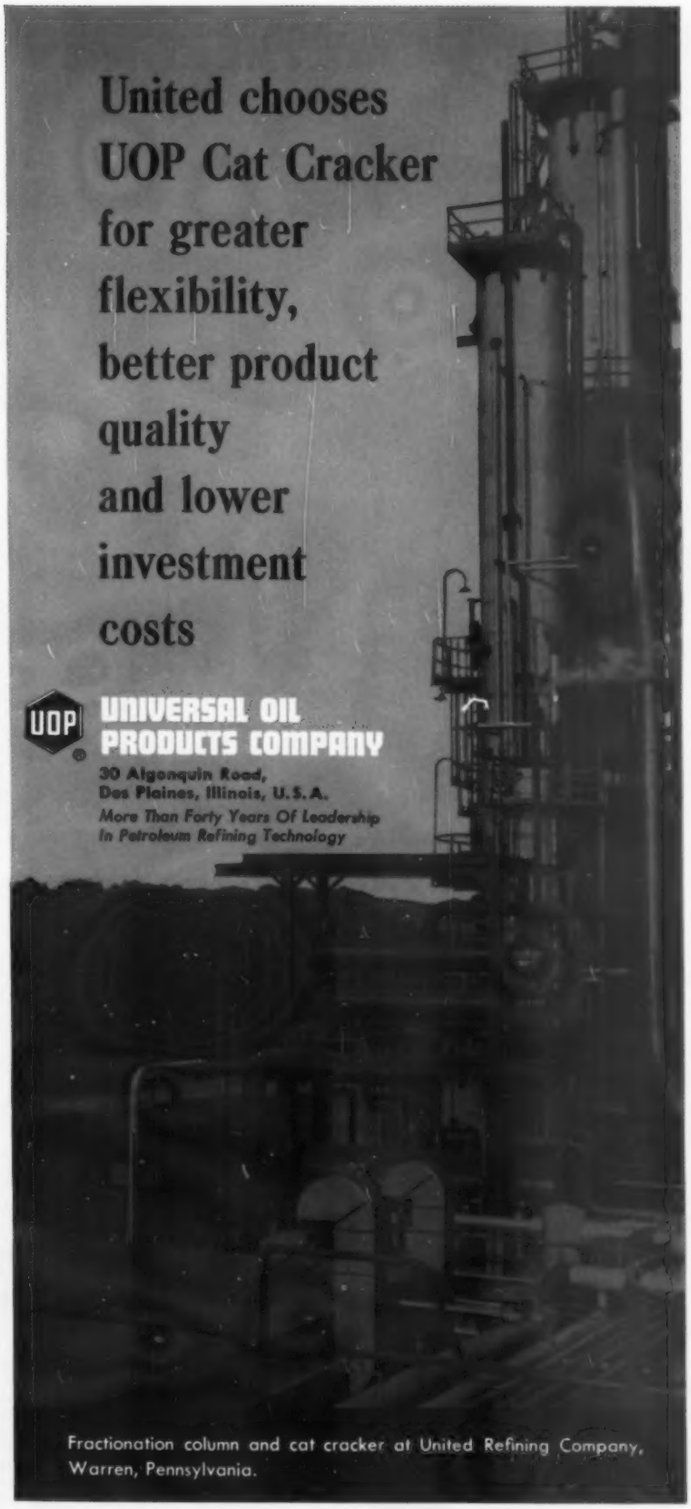
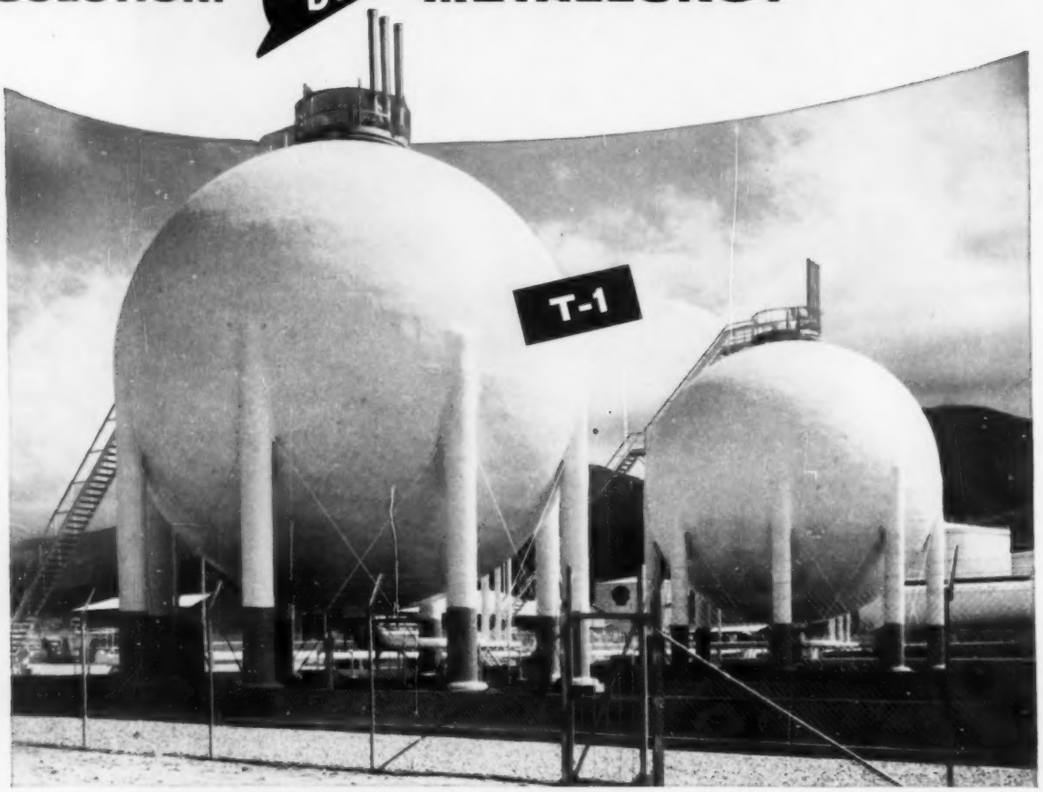
Our 55th anniversary came at a time when, undoubtedly, more is expected from petroleum products than at any other year in our history. Over the years, we have developed a reputation for product quality which we have maintained through the application of the very latest refining technology. At United we use to maximum advantage both the processing know-how of our many years in the refinery business and the technology researched, developed, and made available to us by refinery specialists such as Universal Oil Products Company. In the future we will continue to operate in this tradition.



Fractionation column and cat cracker at United Refining Company, Warren, Pennsylvania.

PROBLEM: More Propane for Caracas

SOLUTION: METALLURGY



Why 2 HORTONSPHERES® do the work of 20 Tanks

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Propane Storage

Compania Shell de Venezuela Ltd.

Capacity: 6,900-bbl. each

Pressure: 235 lbs. per sq. inch

Steel: T-1

Diam: 42-ft.

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Joint Efficiency—95%

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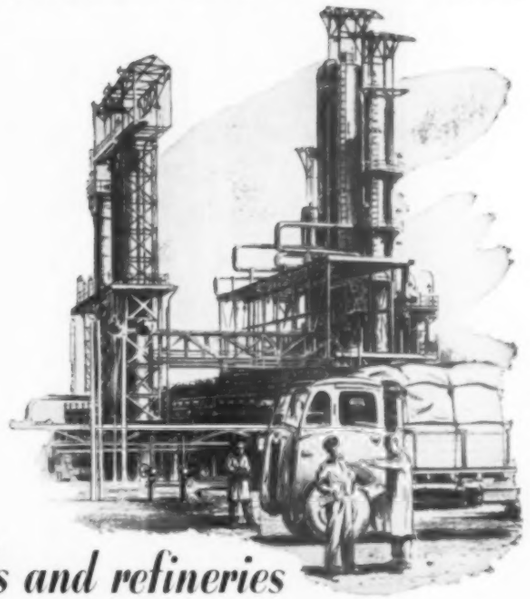

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Out of Morgan City, Louisiana, bound for Venezuela, barges are carrying a new concept in underwater oil drilling: prefab aluminum structures that are installed in two days—that can be salvaged and moved to new locations—that resist corrosion 5 to 9 times better than the metals first used in Maracaibo's brackish waters.

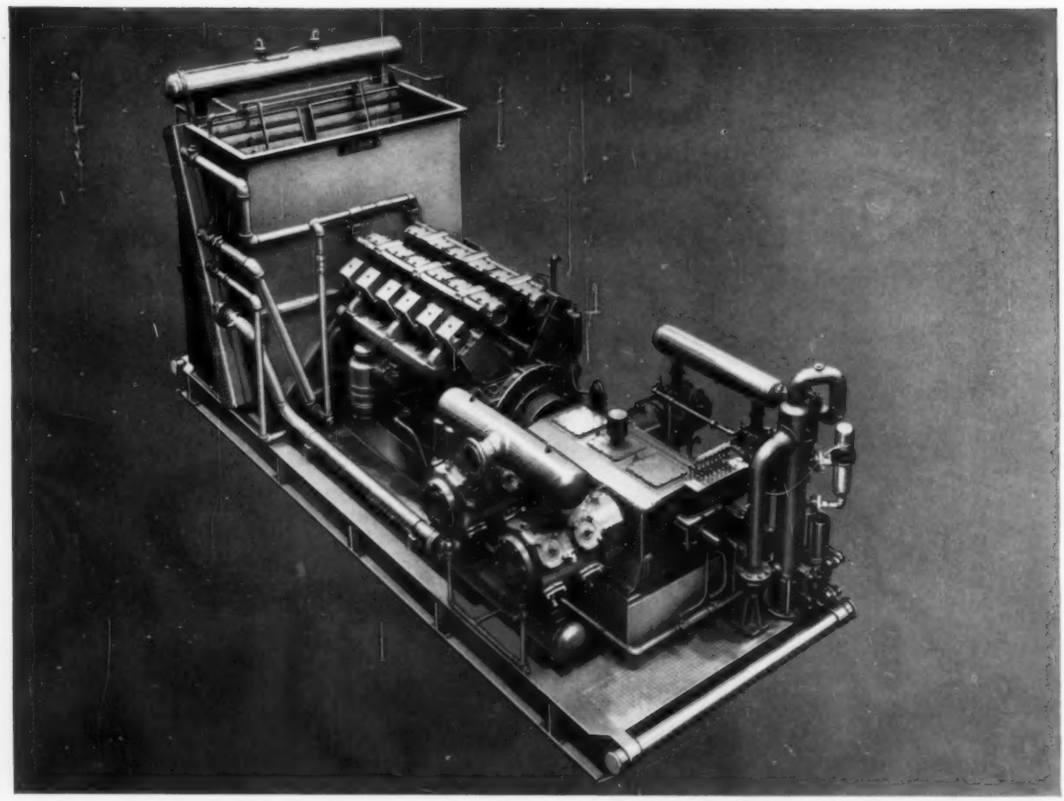
These aluminum structures are also saving money. That's because they are erected faster than concrete structures, with less site labor—and turn installation time into production time.

The new aluminum structures have real meaning to other phases of the petroleum industry. They spotlight the durability—under the toughest conditions—of this light, strong, corrosion-resistant metal. They dramatize the great savings in installation, construction and maintenance made possible by aluminum.

Reynolds Metals Company worked with the J. Ray McDermott Co., Inc. to develop these cost-cutting drilling structures, just as Reynolds has worked with manufacturers in many fields. If you're looking for ways to improve your product or production, consider aluminum. And for help in design, production—even for parts fabrication—call on Reynolds. Phone your nearest Reynolds Office or write *Reynolds Metals Company, P.O. Box 2346-CV, Richmond 18, Virginia, International Division, 19 E. 47th St., New York 17, N.Y.*

Watch Reynolds All-Family Television Program "DISNEYLAND", ABC-TV.

REYNOLDS ALUMINUM



The Clark model CFA-4 is a completely self-contained compressor station. It is built in eight sizes ranging from 200 to 350 bhp.

Clark CFA balanced/opposed compressors are completely packaged for rugged field service

Portable, proved and popular, Clark CFA compressors are specifically built for air drilling, gas lifting, gas gathering, boosting, testing, repressuring, and other exacting oil-field services. These packaged units are available in two and four cylinder models, in sixteen sizes, covering a range of 100 to 350 bhp.

Direct drive assures greater efficiency

In the CFA, Clark engineers have done away with power-robbing, troublesome gears and belts between the engine and the compressor. A simple rubber block coupling takes their place. This direct drive feature is made possible by the perfect balance of the Clark CFA. It explains how the compressor can operate at a modern 1000 rpm. The direct drive design is also responsible for considerable reduction in skid size and in housing costs.

Balanced/opposed design eliminates vibration

Compressor cylinders are mounted on opposite sides of the crankcase and are connected to crankthrows which are 180° apart. With this arrangement, reciprocating masses, which are of equal weight, are always moving in opposite directions. Because there are no unbalanced forces, vibration is practically non-existent and operating costs are cut down and kept to a minimum.

Easier to install, move or shelter

Since the CFA is a self-contained compressor station, installation presents no problem. Just enough concrete to level the unit is all that is required. Clark CFA's are excellent compressors for swamp country, as well as barge and truck mountings. For air drill-

ing, you can even mount the compact CFA on timbers. It won't "walk" away.

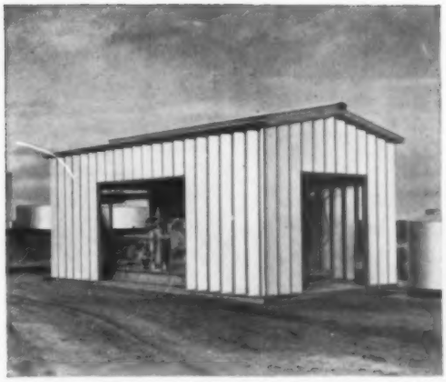
Unitized radiator simplifies cooling

All cooling services are efficiently handled by the unitized radiator built right on the skid . . . and include engine water jacket, compressor cylinder water jacket, lube oil cooling, and as required, inter and after cooling of the gas stream.

CFA contains many "big compressor" features

Into the sturdy Clark CFA have been built many "big compressor" features. These include a steel crankcase, a one-piece forged steel crankshaft, forged steel connecting rods, precision bearings, and forced feed lubrication. You will find that you'll deplete the field, but you won't wear out the Clark CFA.

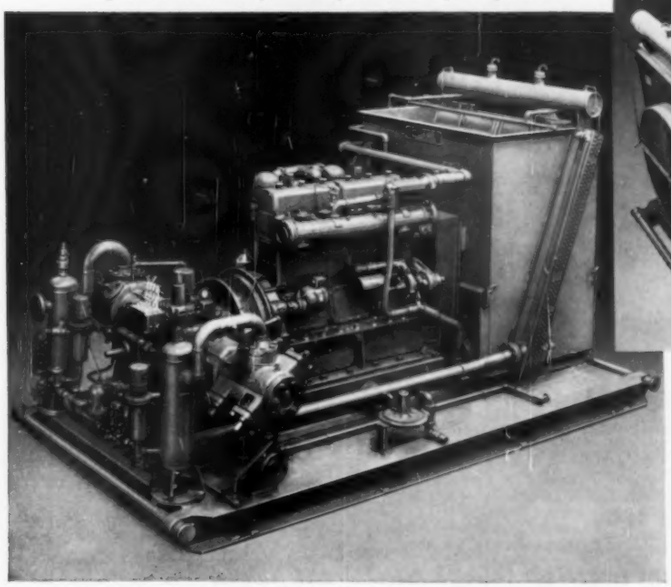
The Clark *encyclopedia of experience* – in design, manufacture, and application is always at your service. For complete data on all CFA balanced/opposed compressors, call your nearby Clark engineer. Or write today for the new Composite Catalog, Bulletin No. 151 to Clark Bros. Co., 1505 Lincoln Avenue, Olean, N. Y. Clark is one of the Dresser Industries and maintains sales and service outlets in principal cities throughout the world.

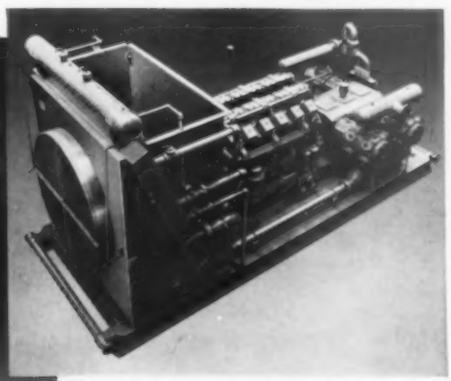


Here a 128 bhp Clark CFA-2 does heavy duty in a field installation for gas gathering. Note the simple installation.

The CFA-2 is also available in electric motor driven units if desired. Illustrated is the 100 bhp model.

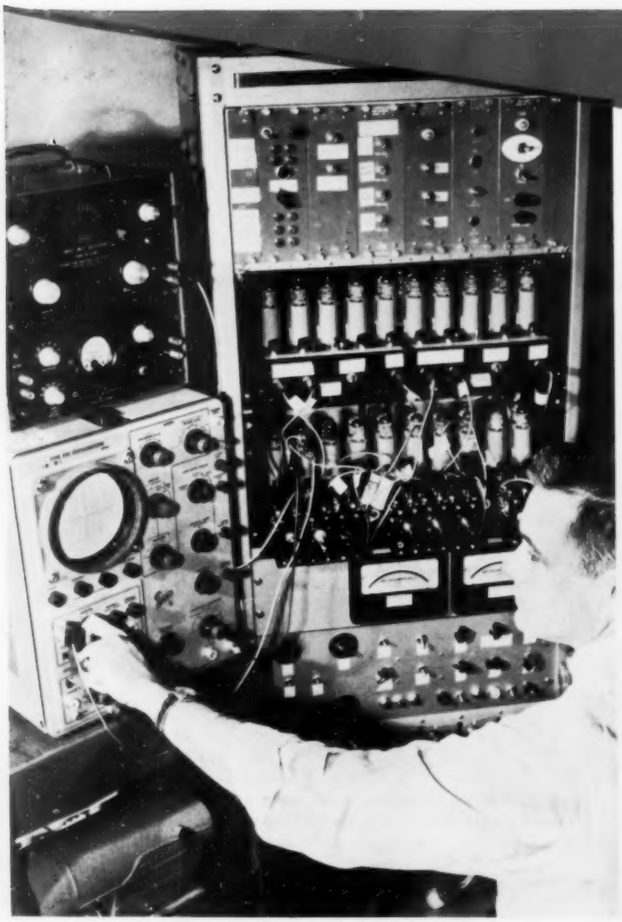
Below: The completely packaged CFA-2 comes in eight sizes ranging from 100 to 200 bhp. No costly field assembly is required.





The unitized radiator in this CFA-4 handles *all* cooling services in one efficient operation. Piping is confined to skid for maximum protection.

CLARK



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DU PONT *Petroleum Chemicals* NEWS

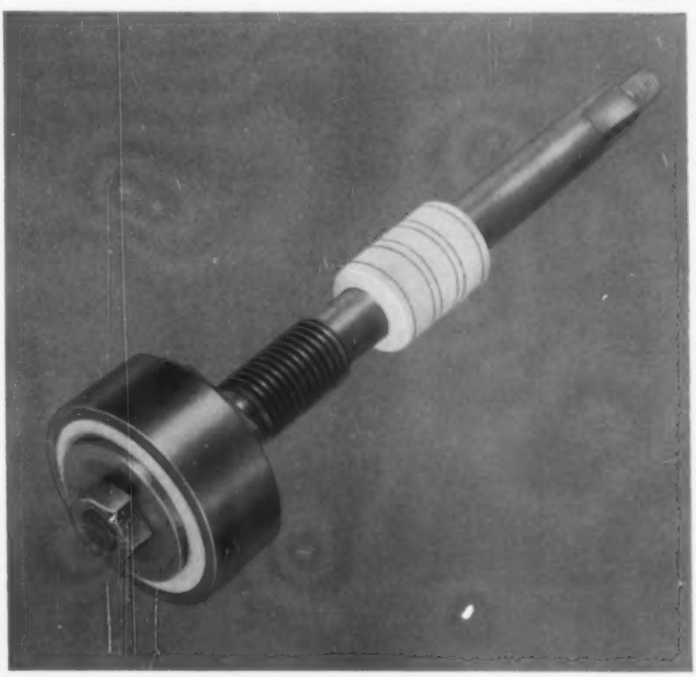
Number 89 in a Series of Bulletins for the Petroleum Industry JULY 1958

New Teflon® parts for TEL valves eliminate many maintenance troubles

Now users of Du Pont tetraethyl lead can look forward to new freedom from faulty valve operation. This has been made possible through the use of "Teflon"* TFE-fluorocarbon resin, as a replacement for the lead closure face in valves controlling the flow of tetraethyl lead.

In addition to the savings on maintenance costs, and the greater convenience, the "Teflon" parts are expected to double the average life of valves used in tetraethyl lead lines. Moreover, the possibility of personnel exposure to tetraethyl lead is reduced.

OVER



NEW DIRECTOR OF SALES

W. ALLEN TAFT was recently appointed Director of Sales of the Du Pont Petroleum Chemicals Division. He succeeds W. Sam Carpenter, III, who has been appointed Assistant General Manager of the Electrochemicals Department.

Mr. Taft joined the Du Pont Company in 1935, starting as a chemist in the Explosives Department. He became a supervisor two years later and has held various supervisory and managerial positions in explosives manufacturing.

In 1950, he was transferred to the Photo Products Department and appointed Assistant Manager of the Parlin, N. J., plant. Entering sales work two years later, Mr. Taft was made Assistant District Manager of the Chicago sales office. In 1953, he was appointed Assistant Director of Sales of the Photo Products Department in Wilmington, and later that same year was advanced to Director of Sales of the department. He held this position until his recent transfer to the Petroleum Chemicals Division.

Mr. Taft was graduated from the Massachusetts Institute of Technology with a B.S. degree in chemical engineering.

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

DU PONT *Petroleum Chemicals* NEWS

CONTINUED

"Teflon" Valves

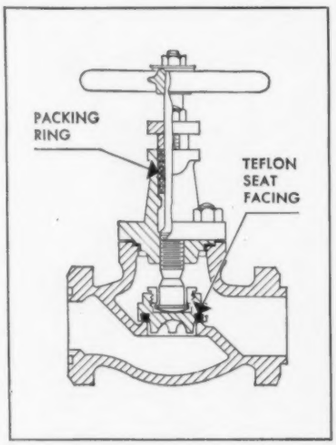
Now a standard specification

Testing of the valves at a number of refineries during the last two and a half years has produced such excellent results that they have been adopted as standard. They will be used exclusively in all new refinery installations, and when replacements are needed in TEL blending plants serviced by the DuPont Petroleum Chemicals Division.

Because of the chemical inertness and the superior wear and lubricating qualities, cup and cone packing of "Teflon," is now used also in the valves having the new-type closure.

Facing stays put

The most common problem with earlier lead-faced valves was that the soft lead, while assuring a tight seat in service, was extruded easily by repeated forceful closure. The conventional packing tended to dry out, causing difficult operation, and also required frequent tightening of the packing gland for leak prevention.



Service life doubled

The average life of the "Teflon"-equipped valves is estimated at more than double the service life of the older type valves.

The new valves are supplied for refinery blending plants by DuPont as one of the company's numerous services to tetraethyl lead customers.

*"Teflon" is DuPont's trademark for its TFE-fluorocarbon resin.

YOU OUGHT TO KNOW...

DANIEL L. PASTELL heads up the engineering division of the DuPont Petroleum Laboratory. He is in charge of the Laboratory's octane evaluations, fuel blending studies, special instrumentation, and the road test work of the DuPont fleet of fuel test cars.

Dan's work keeps him in close contact with both the automotive and petroleum industries. Because of this, he often acts as a "clearinghouse" for information on combustion chamber design and fuel performance, which is of interest to both industries.

In 1950 he won the Horning Memorial Award for his paper "Precombustion Reactions in a Motored Engine." He has also had published a number of other papers on precombustion reactions and fuel blending studies.

He is well versed in electronics as well as chemical engineering, holding a B.S. degree in chemical and electrical engineering, plus a Master's degree in chemical engineering.

Pastell was educated at the University of Washington and served in the Army during World War II. He is a member of the Society of Automotive Engineers, The American Chemical Society, the American Institute of Chemical Engineers and the Institute of Radio Engineers.

DANIEL L. PASTELL

LITERATURE AVAILABLE

Here is a listing of some of the many bulletins, reports, booklets, technical papers, and other aids available to you through DuPont Petroleum Chemicals Division offices:

New DuPont dry-dye Eduction Probe and No-dust Drumhead – A folder describing and illustrating the revolutionary new dry-dye eduction devices which make gasoline dyeing a cleaner, faster, and more efficient operation.

DuPont Petroleum Dyes – Includes data on chemical composition and physical properties of the complete line of DuPont Petroleum Dyes. Also spectrophotometer curves, rate-of-solution tables, addition and handling recommendations.

Advantages of an "Ashless" Additive in Distillate Fuel Oils – Discusses the home heating troubles caused by metallic ash deposits on stack controls and ignition electrodes, and the diesel sparking hazard caused by glowing metallic ash particles. Tells how these adverse side effects can be reduced through the use of an ashless additive.

Sales Promotion Aids for Dealer Meetings—Describes the many DuPont aids available. A handy check list for anyone planning programs for dealer meetings.

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Los Angeles 17—612 So. Flower St. MAdison 5-1691
New York 20—
1270 Ave. of the Americas . . . . . COlumbus 5-2342
Philadelphia 2—3 Penn Center Plaza . LOcust 8-3531
Pittsburgh 22—1 Gateway Center . . . ATlantic 1-2933
San Francisco 4—111 Sutter St. . . . . EXbrook 2-1934
Seattle 3—4003 Aurora Ave. . . . . MElrose 2-6977
Tulsa 1—1811 So. Baltimore Ave. . . . . LUther 5-5578
In Canada—DuPont Company of Canada (1956) Limited, Petroleum Chemicals, 85 Eglinton Ave. East, **Toronto 12**—Ontario . . . . . HUdson 1-6461
In Other Countries—Organic Chemicals Department, Export Division, 7447 Nemours Bldg., Wilmington 98, Del., OLympia 4-5121, Ext. 2962.

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Du Pont Tetraethyl Lead and other Petroleum Additives

OVER

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

A-7129

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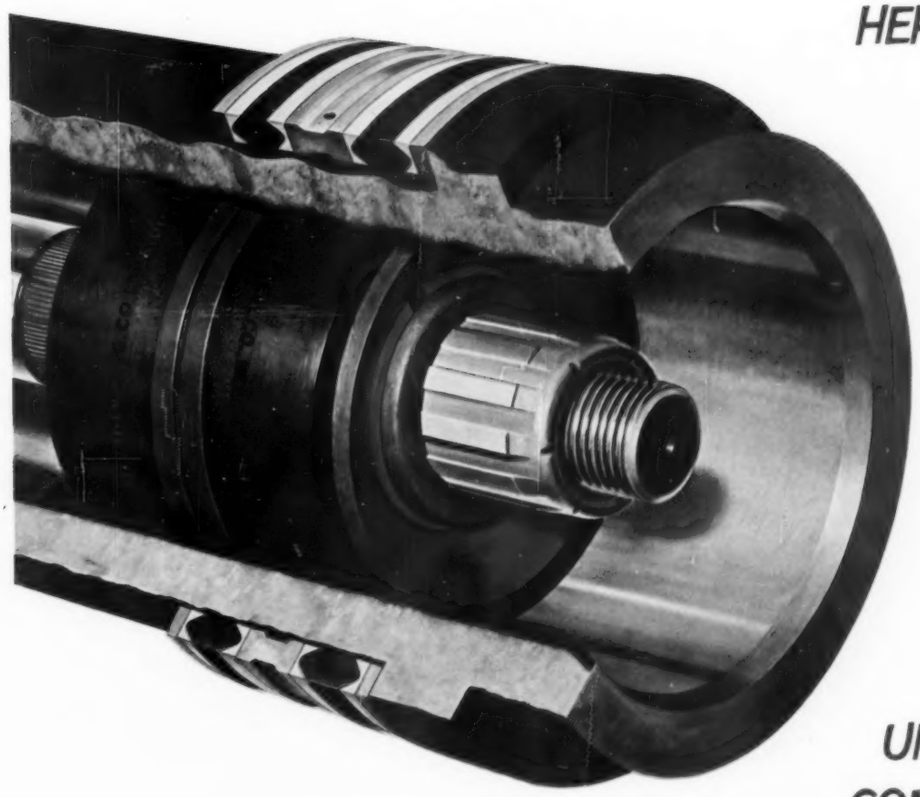

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MISSION PISTONS last longer due to their specially compounded rubber developed through research, and their proven design. They cost less to renew because piston rubbers can be replaced without changing the body.

Forged steel piston bodies feature an accurately machined, induction-hardened, Missionized flange that gives long life and extends both piston rubber and liner life.

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MISSION LINERS keep down piston and liner packing costs as well as liner costs.

For normal to heavy-duty service, Mission Super-Service® Liners are recommended. They feature an accurate, uniformly induction-hardened bore that keeps down piston costs as well as liner costs.

For corrosive service, Mission offers Corrosion Resistant Liners fitted with hardened stainless steel sleeves. In certain areas, these liners have reduced combined piston and liner costs by more than 50 per cent.

In addition, all Mission Liners feature accurately machined outside diameters to assure the longest possible liner packing life.

MISSION SUPER-SERVICE® LINER PACKING feature zero-clearance confinement of packing rings. This exclusive construction has increased packing life so much that costs are often reduced by more than two-thirds.

Taken individually, the savings that result from using *any* of these Mission Pump Parts is substantial. When used together, savings pyramid and down-time is substantially reduced. This is the reason why Mission Pistons, Mission Liners and Mission Liner Packing make an unbeatable combination.

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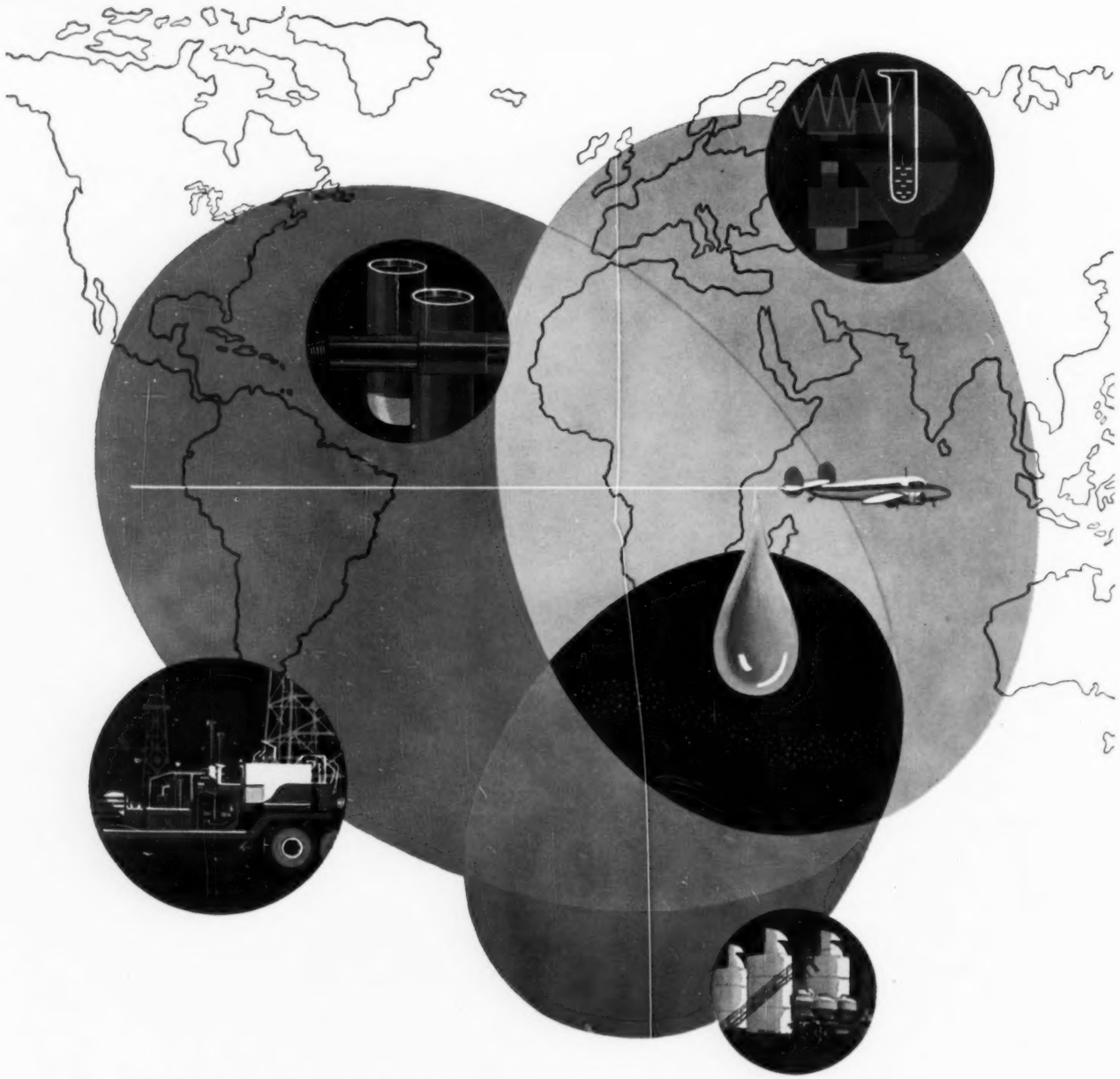

WITHIN THESE SPHERES....

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Dr. Carlos Perez de la Cova, Minister of Mines and Hydrocarbons

VENEZUELA'S OIL POLICY

The technical basis for the establishment of a national regulatory body of the oil industry in Venezuela was set in the year 1930, when the first regulations of the Law of Hydrocarbons were enacted. That date has a special significance in the history of the oil policy of Venezuela. It was my privilege to belong to the first group of engineers who went out to the oil fields as petroleum inspectors to begin the organization of what today is the Petroleum Department of the Government of Venezuela.

Some of the engineers and officials who originally began their career in the organization are still serving their country, and some others have gone to work for the oil companies.

The government of Venezuela is conscious of its responsibility in the vigilance of the exploration and development of its natural resources. It considers that any company or investor who comes to the country to develop its oil and mineral resources must take primarily into account the national interest of Venezuela.

The excellent relations existing today between the government and the oil and mining companies prove that the present system of mutual cooperation is derived from the practical application—through the instrumentality of the laws—of two basic concepts, viz., national sovereignty and business statesmanship.

In the measure that Venezuela has progressed in the development of its natural resources, it is only natural to expect that, within the system of free enterprise, more Venezuelans should participate, on a higher level, in executive and policy-making positions in the oil and mining industries.

Carlos Perez de la Cova

Lake Maracaibo shore line, showing oil wells in the lake (SONJ photo).

Impact of USA oil restrictions on Venezuela

Recent restrictions on imports of oil into the USA have reduced Venezuelan government revenue about 6% and crude production about 17%. Although the material damage is not small, the damage to USA-Venezuelan relations is more important.

WHEN the subject of "United States oil restrictions" is brought up, discussion is generally in terms of the import control programs for PAW Districts I-IV and for District V which were announced in July and December respectively of last year. Those programs are, of course, the only ones which are of practical concern today, but our preoccupation with them tends to obscure the fact that the international oil industry has been faced with these problems, or something similar, for many years.

There is no doubt that the crude import restriction program of July 1957 came as a shock to most of the Venezuelan public. It received a great deal of publicity, and seemed to arrive as a bolt from the blue—with the Suez crisis and the clamor for Venezuelan oil which it produced still fresh in everyone's mind. The District V program in December was even less favorably received. Although its impact on Venezuelan outlet was far less than in the case of the July program, it seemed to the average Venezuelan to be further strong evidence that the United States, for no clear reason, had started on an orgy of restrictionism. It is difficult to convince the public that the Venezuelan oil industry has not been irretrievably damaged by the United States' actions.

Yet the restriction programs of 1957 were not exactly innovations, although they were the first to interfere seriously with Venezuelan petroleum exports. Since mid-1955 an imports-control program has been in effect; and, if we seek the true beginning of the problem, we can go back to the early days of the "oil age" around World War I. Behind the restrictions is the legitimate and laudable concern that the USA should always have a sufficient and secure supply of petroleum. People were worrying about this very problem back in the early 1920's. It was the period of economic boom and the large-scale development of automotive transportation; and, with USA government urging, the oil companies made a large exploration effort in the USA and abroad. The result was a huge increase in the supply of crude—far in excess of the demand which, furthermore, began to decline by 1930 with the onset of the depression.

VENEZUELAN CRUDE-OIL PRODUCTION
(Barrels Daily)

1956	
January	2,324,485
February	2,352,746
March	2,391,984
April	2,313,745
May	2,348,554
June	2,446,134
July	2,459,179
August	2,465,533
September	2,493,042
October	2,535,974
November	2,623,347
December	2,721,566
1957	
January	2,792,036
February	2,850,212
March	2,923,610
April	2,921,233
May	2,936,985
June	2,968,618
July	2,877,511
August	2,751,474
September	2,616,668
October	2,621,032
November	2,554,748
December	2,541,884
1958	
January	2,492,019
February	2,586,322
March	2,492,118

ANTILLES EXPORTS OF PETROLEUM PRODUCTS
(Thousands of Barrels Per Day)

Destination	1938	% of Total	1947	% of Total	1957	% of Total
United States	71.6	17	140.8	20	512.6	39
Canada	—	—	9.3	1	35.9	3
Latin America	67.5	15	177.8	25	243.8	18
Europe	211.0	49	273.7	38	240.5	18
Africa	36.4	8	39.9	6	82.3	6
Others	45.4	10	78.1	11	206.6	16
Total	431.9		719.6		1,321.8	

The now familiar agitation for control of oil imports began, and found success in the Revenue Act of 1932 which imposed import duties on crude and products. This first move toward restrictions did not solve the problem of oversupply in the United States. Imports fell sharply, but the domestic surplus had to await prorationing in the main producing states and an economic recovery before it was eased.

More comparable with the current quantitative restrictions was the program launched in 1955 on the recommendation of the Cabinet Committee on Fuels Policy. After World War II, USA petroleum demand remained high, and increased rapidly most of the time. Exploration and drilling effort in the USA and abroad was stepped up considerably. Between 1945 and 1954, demand in the United States rose by 2,757,000 b/d, while domestic crude and natural-gas-liquids production rose by 2,025,000 b/d. Perhaps more significantly, spare crude producing capacity reached nearly 2 million b/d in 1954. Imports of crude and products increased over the period by 741,000 b/d, to a level exceeding 1,050,000 b/d. It was during the occasional downward fluctuations of demand that further restrictions on oil imports were urged most strongly by the USA domestic crude producers and their supporters in Congress. These efforts did not meet with success until the Cabinet Committee on Fuels Policy was asked, in July 1954, to examine the position. The work of this committee and the administration's application of its recommendations over the following years show how a continuous effort was made to solve the oil imports problem.

The first basic recommendation was that the "1954 ratio" of crude and heavy fuel-oil imports to domestic production be maintained, through voluntary cooperation of the importing companies. Subsequently, various amendments were made to the program. Imports into District V were excluded from its scope, as were imports from Venezuela and Canada and all imports of heavy fuel oil. For a time the plan worked fairly well, and toward the end of 1956 the Suez crisis temporarily shelved the whole question of restricting oil imports.

However, by the spring of 1957 it was clear that a considerable degree of oversupply was in store once the normal channels of trade were re-established. Under the "national security" provisions of the law, a Special Committee to Investigate Crude Oil Imports was set up, to evolve a program which this time would require much stricter compliance than previously. It is true that compliance with the earlier restriction programs had not been consistent. Some importers held strictly to their "allowables" throughout, but some were unable or unwilling to do so. The noncompliers were mainly those which had built new refineries, with operations designed to use foreign crude, or those which were newcomers to importing and hence with small allowables on the "1954 ratio" basis.

The special committee's first program, put into effect as from July 1, 1957, covered PAW Districts I-IV (the continental United States, excluding the states west of the Rocky Mountains) and allocated quotas among importers which held permissible crude imports to an average of 755,700 b/d, subsequently revised retroactively to 782,-900 b/d for the period through July 1, 1958. (Crude imports into Districts I-IV in June 1957 had averaged 872,000 b/d). The plan was voluntary, although there was an implied threat of mandatory restrictions if importers failed to comply. No exceptions were made in respect of crude imports from any source.

The second plan, effective from January 1, 1958, covered the West Coast (District V), and quotas were allocated totaling 220,000 b/d. December 1957 crude imports into District V had been 261,000 b/d. In March 1958, revised quotas were issued for Districts I-IV, admitting a number of new-

VENEZUELAN EXPORTS OF CRUDE OIL
(Thousands of Barrels Per Day)

Destination	1938	% of Total	1947	% of Total	1957	% of Total
United States	64.7	56	218.5	53	538.5	39
Canada	6.6	6	77.1	19	232.2	17
Latin America	1.9	2	26.1	6	262.0	19
Europe	41.4	36	80.2	20	308.5	23
Africa	1.3	1	6.9	2	18.3	1
Others	—	—	—	—	6.8	1
Total	115.9		408.8		1,366.3	

Venezualan drilling team in operation (Creole Petroleum photo).

comers to the program but cutting the total allowable by 70,000 b/d. As of the date of preparation of this paper (mid-May 1958), revision of District V quotas is now being considered.

So far as Venezuela was concerned, the crude-import restriction programs of 1957 and 1958 were perhaps worst in their psychological and political effects. They were not unexpected by the Venezuelan oil industry—which, as has been pointed out, had been subjected potentially or actually to USA import controls in a milder form for some years. The economic effects of the present programs have scarcely had time to transmit themselves to the general economy, and in any case are interwoven with the effects of the general worldwide weakness in petroleum demand. But, politically, the restrictions could scarcely have come at a worse time. Six months after the institution of the July program, a 10-year-old dictatorship was overthrown in Venezuela. Subsequent political, economic, and social conditions have been confused, and may remain so for some time. Emotions bottled up for 10 years are now being freely expressed, and public issues are discussed with a fervor which understandably is intense. This is a time when the friendship between the United States and Venezuela needs to be re-emphasized in every possible way; and, although United States import restrictions are in no sense a negation of that friendship, it is very difficult to counter the impression in some Venezuelan circles that they are.

Anything that affects Venezuelan petroleum exports to the United States is a public issue of prime importance; for petroleum exports are the fundamental basis of Venezuelan prosperity, and the United States is the largest market. It has always been the largest customer for Venezuelan crude oil, although its percentage share of total Venezuelan crude exports has fallen since the war—mainly as a result of the growth of new markets in Canada and Latin America, where refinery construction has been rapid. In 1957, the USA took nearly 540,000 b/d of Venezuela's crude—about 40% of total crude exports. In 1938, the volume was only 65,000 b/d.

A remarkable increase has also occurred in USA purchases of refined products from Venezuela and from the refineries in the Netherlands Antilles, which operate mostly with Venezuelan crude. These product shipments—nearly all fuel oil—rose in 1957 to 513,000 b/d, from 72,000 b/d in 1938. There is good economic reason for the trend toward greater USA imports of heavy fuel oil, since refiners in the United States maximize their return by extracting as high a yield as possible of the lighter products, so that the fuel-oil yield in the USA has been actually falling for many years.

Taking crude and products together, the United States accounted in 1957 for 39% —some 1,050,000 b/d—of Venezuelan-Netherlands Antilles petroleum exports. But for import restrictions on crude effective in the latter half of the year, the amount would almost certainly have been higher. Canada took 10%—mostly in the form of crude; Latin America, 19%; and Europe, 20%. The last named accounted for nearly half of the Venezuelan-Netherlands Antilles market before World War II; Europe's main supplier is now the Middle East. Venezuela's exports have thus become increasingly orientated toward the Western Hemisphere—with the United States remaining the dominant market.

Any significant disturbance of that market has an impact on the whole Venezuelan economy. The full impact is not immediate, because a large proportion of oil-company payments to the government lags behind oil-company receipts by considerable periods—income tax for any one year being payable, with government approval, in three installments over a period of up to six months in the following year. That is the principal reason why 1957 was such a good year for government income and Venezuelan imports from the USA despite the fall in crude production in the latter part of the year; much of the economic health of 1957 was transmitted from the operations of 1956.

The government received nearly $900 million of its income from the oil industry, in 1957, in the form of production taxes, income taxes, customs duties, and other taxes. A further $370 million was received in payments for new concessions—bringing the oil industry's contribution to total government income to 73%. The proportion was 74% in 1956—another year in which concessions were granted; and from 1946 to 1955 fluctuated around 60%.

These payments to the government are directly related to the level of production and exports. Any time in the past that oil-industry operations have declined substantially, so has government income and so, consequently, has the elevel of economic activity in general.

Venezuela is a fast-developing country, where government expenditures on public works are a very important economic factor. The connection between Venezuelan oil-industry conditions and overall economic prosperity in the country is direct and inescapable. The connection between economic prosperity and political stability is less direct, but it is certainly present, and of prime importance.

The oil industry earned 66% of the foreign-exchange receipts of Venezuela in 1955. In 1956 and 1957, the percentages were 74% and 71%, but they included the large nonrecurring payments to the government for oil concessions.

The influence of the oil industry on the economy is really much greater than the

statistics of government revenue and exchange receipts show. Oil is the basis for years of prosperity which have been experienced, and this prosperity has stimulated the growth of a wide range of enterprises in the non-oil sector. The government's policy is toward diversification of the economy, but most observers agree that it will be many years befor the oil industry ceases to be the overwhelming dominant sector. It is almost exclusively an export industry—less than 3% of the output being consumed locally; and it is an export industry largely dependent on the USA market.

There is also the other side of the picture to be considered—Venezuela as a customer for American goods and services. It would be stretching a point to suggest that the USA economy is dependent on the Venezuelan market, but it can be fairly said that Venezuela is an important outlet for many USA export industries.

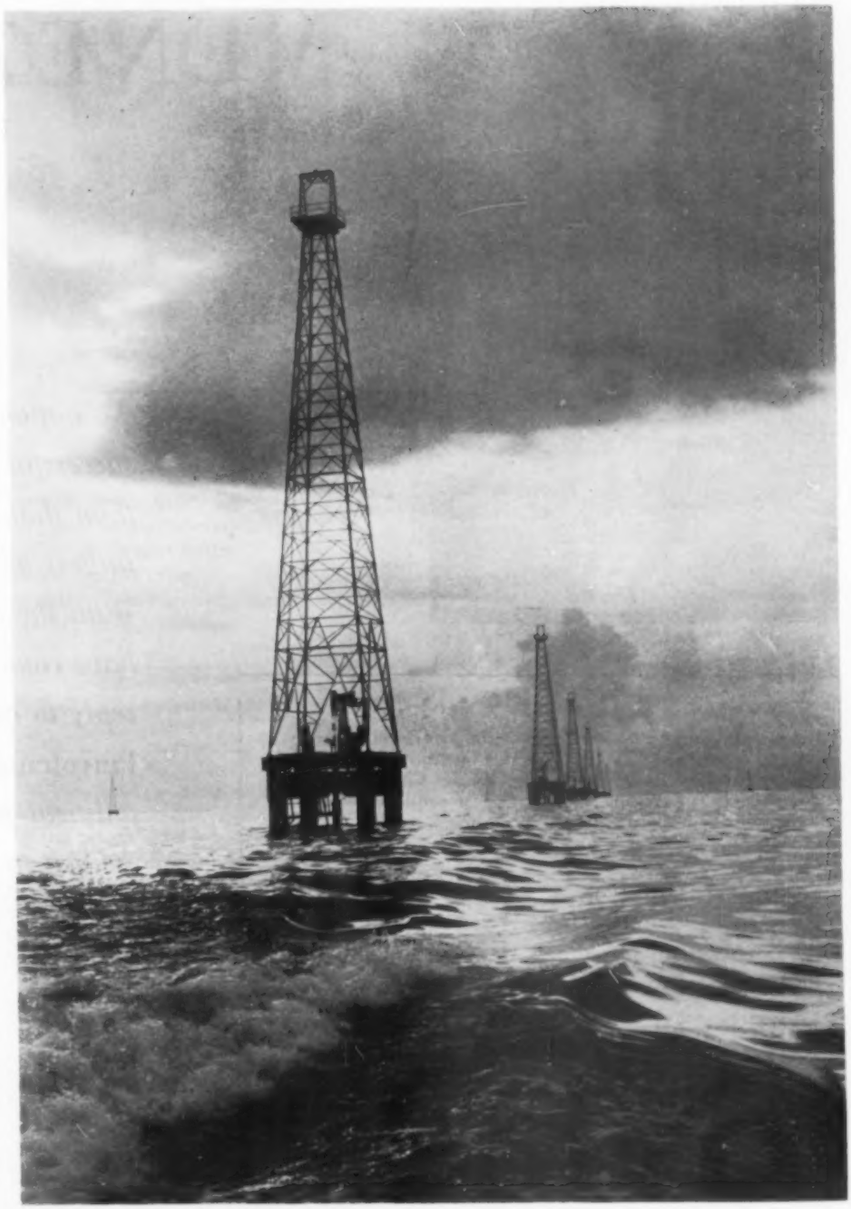
The international economy is full of illustrations of the saying that "trade is a two-way street." Venezuelan-USA trade is as choice an example as any. The level of Venezuelan imports of goods and services generally follows the trend of her petroleum exports. The United States is easily the largest supplier, just as she is the largest customer.

The 1957 level of the USA commodity exports to Venezuela was $1,005 million, plus an estimated $500 million of "intangibles" such as banking, insurance and transportation services, and remittances of profits.

In terms of merchandise exports alone, this made Venezuela the largest market for the United States in Latin America. If we exclude Canada, whose trade is naturally closely tied to the USA, Venezuela is the United States' best customer in the whole of the Western Hemisphere. This is all the more remarkable when we recall that Venezuela is one of the smaller countries of the hemisphere in terms of population—only about six million. Thus Venezuela buys an average of over $170 worth annually of USA comodities (excluding services) per head of population, compared with about $5 in Brazil, $10 in Argentina, $30 in Mexico, and $85 in Cuba.

The trade has grown rapidly, and much faster than Venezuela's exports to the USA. Only $19 million worth of merchandise was imported from the USA as recently as 1935.

Venezuela's imports from the USA are varied, and include a wide range of capital and consumer goods produced all over the United States. The most important group in 1957 was "machinery and vehicles," which accounted for $493 million. $217 million in "metals and manufactures," $35 million in "textile fibers and manufactures," $78 million in food products, and $27 million in wood and paper were also among the $1,005 million of commodities imported from the USA in 1957. The imports came from 45 different states—led by New York, Michigan, New Jersey, Ohio, Pennsylvania, and Illinois. Venezuela's ability to maintain and expand these not insignificant imports is directly related to her ability to earn dollars to pay for them.



Rows of derricks in Lake Maracaibo (Creole Petroleum photo).

The purpose of the foregoing has been to point out the mutual importance to the two countries of their trade. USA petroleum import restrictions have already affected that trade. Prior to the July 1957 program, the impact was inconsequential because imports from Venezuela were unaffected for most of the time, and the restrictions were moderate in any case. The present restrictions are of a different order. They will have a definite—though delayed—impact on the Venezuelan oil industry and economy. The impact will not be ruinous unless the restrictions become much worse, but they cannot be dismissed as of no importance.

It is not a simple matter to isolate and estimate the effects of USA crude import restrictions. There are no "allowables" for supplying countries as such, and importers are free to make their cuts from any source. The mere fall in Venezuelan crude production or exports will not give the answer, because other influences besides restrictions have entered the world petroleum situation to invalidate these criteria. However, it is possible to make a rough estimate by looking at changes in the plans of importers after restrictions had been imposed. Importing companies report to the Texas Railroad Commission their actual imports, by country of origin, for the reporting month and their programs for five months ahead. These reports are published. The

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VENEZUELAN

An outstanding political figure in Venezuela, and head of the COPEI (Organizing Committee for Independent Elections) party, Dr. Rafael Caldera is a university professor well versed in economics and influential in Venezuela's oil policies.

No nation's oil policy is more successful nor watched more closely than that of Venezuela, second largest oil producer in the world. With the advent of new democracy have come demands for change. In reply to questions from World Petroleum *the two most influential political party leaders have written to express their views*

QUESTION: *What is your opinion on the way the oil companies have conducted themselves in Venezuela?* ANSWER: To give an opinion on the oil companies' conduct in Venezuela is more like giving an opinion on how the Venezuelans themselves have acted toward petroleum. In general terms, the attitudes of the companies has fluctuated with that of the Venezuelan State. At first, it was a case of negotiation of a new business enterprise; the entrepreneurs were anxious to assure themselves the greatest security possible against risks of large proportions. The State found in itself a double weakness: lack of knowledge of the industry, and internal corruption.

In such a case, it should not surprise us that the first laws were advantageous to the companies, or that at first negotiations were influenced by the venal interests of government functionaries. Only after some decades did a national attitude on the problem begin to take shape. At the same time, the strengthening of the Venezuelan attitude was helped by a new attitude in public life in the United States and by a transformation in the thinking of its businessmen.

On the other hand, the Mexican experience opened the eyes of company management to the social and political perspectives of the oil problem, where they were previously concerned only with its financial side. In 1936, when a new political life began in Venezuela, there also began a new attitude on the part of the companies—an attitude impelled by the Labor Law, the new oil legislation, and by the reform of 1943 and by changes in fiscal legislation. The accord between the companies and the State has been solider since then, because is it on a more sincere basis, and public relations of the companies in the diverse sectors of national life have been improved progressively—which has been appreciated by Venezuelans occupied in many different activities. The collective contracts of the oil companies with the workers, the establishment of foundations with social objectives, assistance to cultural iniatives, technical and economic assistance, have been positive facts spreading through and strengthening Venezuelan life.

QUESTION: *How do you think the Venezuelan oil worker has benefited in his relations with the companies? What plans does your party have concerning labor organization and social improvement?* ANSWER: The principal points of social betterment for oil workers is contained, in one instance, in the Labor Law of 1936 and the Decree on Labor Participation in Profit Sharing of 1938; and, on the other hand, in the development of negotiations and contracts between the companies and workers. This collective negotiation has been the determining factor of new benefits obtained within the frame of discussions which never prejudiced—in fact, helped—the national economy. I believe, for my part, that the unionization movement must go on improving and strengthening its methods and aims. Thus it will arrive at more and more improvements which, in their turn, will have beneficial repercussions on the general situation of workers in other industries.

There is another fact worthy of consideration: an industry of such size and influence over the life of a country, such as the oil industry in Venezuela, occupies a relatively small number of workers. The industry can give large benefits and compensations to these workers, but the com-

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VIEWS ON OIL

A distinguished Venezuelan and a former president, Dr. Romulo Betancourt now heads Venezuela's largest political party, Accion Democratica. He is author of *Venezuela: Politics and Petroleum*, and is intimately familiar with, and influential in, the oil policy of Venezuela.

QUESTION: *What is your opinion on the way the oil companies have conducted themselves in Venezuela?* ANSWER: The oil companies have conducted themselves in various ways. To appreciate their conduct—which was contrary to the best interest of the country during the long period of tyranny under Juan Vicente Gómez—one has only to read what Professor Edwin Lieuwen wrote about the matter in his book *Petroleum in Venezuela: A History*, University of California Press (1954). During the decade following the Gómez regime, there were faults in the conduct of the oil companies. During the triennium of 1945-48, they adapted themselves to the new conditions, when the government was in the hands of a party based fully on public opinion and with a sense of administrative responsibility.

Referring to the conduct of the oil companies during the three-year government of the party of Democratic Action, in my book *Venezuela, Política y Petróleo* (Venezuela: Politics and Petroleum), page 806, I wrote that such conduct was not "active resistance to official plans." During the decade of dictatorial governments—and without the prevailing consensus from 1948 to 1958—the oil companies took advantage of the indefensible state of the country, and again began to follow, to a certain extent, practices which were believed to have been overcome. Such practices have not benefited Venezuela; and, if they made it possible for the oil companies to obtain immediate economic advantages, they have created at the same time an atmosphere of misgivings about them—which was disappearing during the triennium of 1945-48. Since petroleum is the principal wealth of Venezuela, and since the companies which exploit it are located in our country, both Venezuelans and the companies themselves should reach conclusions from the experience accumulated. I could name two of these conclusions: (1) Venezuelans no longer should tolerate self-appointed governments resulting from violent assaults on the constituted power by minorities without moral or political solvency, and should exert every effort to the end that our governments shall be reliable and always born of free elections; (2) the oil companies should bear in mind that, if dictatorships allow them to operate behind a serious governmental supervision, and if by this they obtain transitory advantages, it is at the expense of creating public resistance. The harmonious development of the petroleum industry, in the first exporting country of the world and the largest producer of crude oil in the Western Hemisphere after the United States, calls for two basic conditions: (a) responsible and democratic governments in Venezuela; (b) acceptance by the oil companies of the idea that such regimes offer them more permanent stability than the transitory and aleatory advantages obtained from governments devoid of administrative ethics and a sense of national responsibility—as it happens with those born out of violence and maintained only by violence.

QUESTION: *How do you think the Venezuelan oil worker has benefited in his relations with the companies? What plans does your party have concerning labor organization and social improvement?* ANSWER: Likewise, there have been variations in the worker-employer relations in the oil industry according to the type of governments set up in Venezuela. With democratic regimes, such relations have been better and more harmonious because they facilitated the normal bargaining between both parties and the free operations of labor unions. Under dictatorial governments, the freedom to contract was never in operation—for which reason there was a constant accumulation of resentment among the workers towards their employers. The party of Democratic Action considers that, in a modern industrial society, there can and should exist harmony between workers and employers through a system of reasonable adjustments in wages and social aid made through collective bargaining. In the case of the workers in the petroleum industry in particular, our government has supported—and still continues supporting—these points of view: (1) The wages and the degree of social aid in the field of production must be high because the profits obtained by the oil industry are also exceptionally high. (2) The continuous and exorbitant rises in the wages of oil workers are not reasonable because they create a sort of labor aristocracy, and because an exaggerated level of income for such workers would tend to extend to other fields of production which are not in a position to stand such expense.

QUESTION: *What do you think of the 50-50 concept of the petroleum law? Do you think it should be changed? What formula would you suggest for it?* ANSWER: The

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Dr. Rafael Caldera

mon aim is that such benefits will tend to reach out and help the entire working class.

QUESTION: *What do you think of the 50-50 concept of the petroleum law? Do you think it should be changed? What formula would you suggest for it?* ANSWER: The 50-50 represented for many years a national aspiration which appeared impossible to achieve. Now, if we take the figures supplied by the government and by the companies, the participation of Venezuela is more than half. This is, of course, in an extractive industry, where the product is found in its natural form. The country supplies the article; the companies supply the initiative, capital, and technical skill. In all cases, I can assure you that I have found a universal agreement in that the petroleum industry is being directed carefully—with discussions taking place in a friendly atmosphere, and with understanding of the oil companies' problems regarding rights acquired; and no actions are to be taken the repercussions of which have not been carefully studied. Venezuela has given the world an example of surprising maturity in the face of so upsetting a question as oil. The nation by firm actions, combined with prudence, has continued to obtain more and better benefits; the workers have benefited as well—and, with all this, the companies themselves have not failed to build a magnificent business. There are reasons, therefore, to be optimistic; and the evolution of an industry which is of a dynamic character, rather than state-owned, should keep the same pace with the evolution of the country.

QUESTION: *What is your attitude toward the nationalization of the petroleum industry?* ANSWER: That depends on what you mean by nationalization. If by that word you mean expropration or confiscation, nobody in Venezuela is thinking of that in this era. If by nationalization you mean—as it should be meant—to make Venezuelan an essential sector of our economy, I believe that it should be pushed decidedly. In a way, the process of nationalization began with the Labor Law of 1936, which specified that 75% of the labor force, both manual and nonmanual, must be Venezuelan. Up to that time, the petroleum industry was a completely foreign enterprise—foreign capital, foreign engineers and foreign workers. When Venezuelans were tried, they were found fully capable and gave better results than those before.

Nationalization is an objective which may be reached by many roads—among them the increase in the number of Venezuelan technicians who participate in the diverse phases of the petroleum industry and, above all, that interest in petroleum which the State should show, as a proper question, not a simple question of financial concern only. The State must abandon the comfortable position of an Arab receiving his income; should share with the companies the responsibilities and worries of production and the responsibility of assuring consumption, defending markets, pushing technical progress; and attempt to make the transportation, refining, and sale of petroleum into factors of national development in the various fields. If the companies understand this idea in its true sense, reciprocal good faith will allay suspicions. Venezuela and the companies do not have to treat each other like enemies, but as parts intertwined by a common interest.

QUESTION: *What is your opinion concerning the restriction of oil imports into the United States?* ANSWER: The restrictions plan constitutes, naturally, an alarming development for Venezuela. The petroleum industry is, for the United States, a simple branch of its economy. Texas, a large oil state, has a rich cattle industry and numerous economic activities which compensate for any decrease in oil exports. On the other hand, in Venezuela petroleum is the basic determinant of our economic life. Any restrictive fluctuation has incalculable repercussions. We have noted with satisfaction that the North American government realizes that so vital a question for us cannot be treated purely as an issue of internal politics, nor be resolved by a unilateral decision; but that it must be discussed, amiably, by the two parties involved—searching for solutions which are equitable. The restrictions not only compromise the principle of free trade; they are directly related to our economic stability, to our progress, to our existence, which has always been that of a sincere and firm friend of the United States.

Permit me to express, on the other hand, my hope that those who today direct the affairs of North American life do not forget the lessons learned by experience. In an occasion such as this, the solution of the North American economic problem, on which depends the stability of the western world, cannot be found in a progressive reduction of production which, in its turn, will continue and aggravate its consequences in a vicious circle. Equilibrium should be re-established positively by raising consumption—not by restricting production. The bold initiatives of Roosevelt when the crisis raised him to power should not be forgotten. The government of the United States has sufficient economic potential in itself to compensate, by unprecedented economic activity in times of depression, for deficiencies in the private economic sector. If the State has some economic role to play, it must be that of moderating cyclical processes, intensifying activities where private initiative becomes weakened, and leaving the field when private initiative has again strengthened itself. Studying the basics of this decline in oil consumption, one cannot find sufficient reason for it in a world whose requirements for energy are rising daily. If the lowered demand for fuels has occurred for natural cyclical reasons, steps should be taken to correct these temporal effects, especially when it appears certain that the consumption of petroleum will grow in a few years. In this way, then, rather than by restrictions, not only will the United States benefit, but also her own producers in Texas—and Venezuela too, an ally of North America, a large consumer of her industrial products. And so will the companies benefit which extract our petroleum—among which there is a large percentage of North American interests whose prosperity benefits the United States. END

Dr. Romulo Betancourt

50-50 law was established under the government of the Democratic Action party. It is neither a rigid nor an unchangeable formula. We have not changed our well-known policy that Venezuela must obtain all licit advantages possible emanating from the fact that it is the owner of the subsoil from whence comes the crude oil. But we also believe that the decisions on this matter must be subject to full and careful discussion between the parties—seeing always that Venezuelan petroleum maintains its position to compete normally in the consuming markets with that of other countries.

QUESTION: *What is your attitude toward the nationalization of the petroleum industry?* ANSWER: The Democratic Action party is not posing now—nor has it posed in the past—the thesis of total nationalization of the oil industry. We believe the State should have a greater participation in some activities of the industry—without wishing to suggest the idea of substitution of official partnerships for private industry. Venezuela has an international responsibility by reason of being the principal supplier for the Western Hemisphere of a basic product such as petroleum. This thought is always in the mind of responsible Venezuelans, and for this reason we do not speculate with formulas which might impede the fulfillment of such responsibility.

QUESTION: *What is your opinion concerning the restriction of oil imports into the United States?* ANSWER: We believe that, by a tripartite arrangement between the governments of Venezuela and the United States and the oil companies, it is possible to arrive at a formula which would permit stabilization for several years of Venezuelan production at a given level. Considering the national interests of both countries, neither Venezuela nor the United States would find it expedient to return to a daily production of three million barrels. This would mean a possible depletion of the calculated Venezuelan reserves in the course of the next 15 years. The practical thing would be to reach an agreement as the one suggested—which would permit Venezuela to maintain a stable level of production without an appreciable decrease in the income the country receives from its oil—which pays for its imports mostly coming from the United States. END

Geophysical exploration in Venezuela (Creole photo).

Venezuelan exploration high

EXPLORATION in Venezuela continues high, on the crest of the new concession grants of 1957 and 1956. Exploratory wells during 1957 were about 24% over 1956, and another substantial increase is in the offing for 1958—although most of the companies are keeping their plans fluid in the expectation of a generally higher level of business in the United States during the latter half of 1958.

For the Venezuelan industry as a whole, wildcats drilled in 1957 totaled 174—about 24% over 1956. Most were in Zulia, as can be seen by accompanying tables. Wells drilled in 1957 totaled 1,828—with total footage of 11,125,135. The well total was up about 20% over 1956, but the average depth was less—about 6,017 ft vs. 6,356 ft in 1956, probably due to the development drilling early in 1956.

Rigs operating rose to an average 115 for the year, of which wildcat drilling represented 30%—a sharp increase over the 15% during 1956 as new concessionaires in Venezuela began drilling on their acreage.

1957 discoveries were as follows: In Anzoategui, a number of new-field and new-pool discoveries were made in Greater Oficina and Anaco, and two new-pool finds were made in the Unaro-Zuron area. In Barinas, seven wildcats were drilled—of which three discovered new pools and one (Palmita-1) a new field. In Delta Amacuro, shallow production was discovered at Capure. In Falcon, a new field was discovered at Tiguaje. In Guarico, both new-field and new-pool finds were made in Greater Mercedes. In Monagas, new pools were found at Quiriquire and Jobo, and new fields at Cachipo, Aguassay, and Oritupano. In Zulia, discoveries were made at Tarra and Alturitas (on land), and at Lagunillas, Bachaquero, Urdaneta, and a number of new fields on and near new concessions in Lake Maracaibo.

There was a "second round" of concession awards in 1957—bigger in area and in payments than the 1956 round. Acreage conceded totaled 1,260,294 acres, and bonuses amounted to $369,399,124. Blocks were let in Lake Maracaibo, Barinas, the Gulf of Paria, and North and South Monagas. Prices paid averaged from $76 an acre for exploration acreage in Barinas to $1,532 an acre for semiproven blocks in Lake Maracaibo.

"New" concessionaires in 1957 were Continental, Pan Venezuelan, King-Mill, and Venezuelan American Independent Oil Producers Assn. (the small holdings of the last-named were taken over by Venezuelan Atlantic, Venezuelan Sun, and Seaboard as a group). Newcomers acquiring partial interests in 1957 concessions were Ashland, Canadian Atlantic, Cities Service, El Paso Natural Gas, Kerr-McGee, Ohio, Pacific Petroleums, Richfield, Sunray Mid-Continent, and Western Natural Gas.

There follows a review, by company, of work during 1957 and early 1958—with some indication of plans during the remainder of this year:

Creole Petroleum Corp.: Exploration activities continued at a high level during the last quarter of 1957 and first quarter of 1958. During this period, 20 wildcat wells were abandoned, 15 suspended, and 10 completed. The total depth of these 45 wells averaged 9,500 ft. Western and eastern Venezuela were equally active—with 23 and 21 wildcats, respectively. Barinas trailed behind with only one. The exploration effort was most successful in Lake Maracaibo. Drilling in Barinas resulted in a dry hole, while the activity in eastern Venezuela has not produced any significant discoveries.

Geophysical and geological crews added up to 80.5 party-months. Seismic work was 37.5 party-months, geological field parties 25, and gravity-meter crews 18. Again, eastern and western Venezuela were even—with 29 and 28 party-months, respectively. Barinas was close behind, with 23.5.

The remaining three quarters of 1958 will probably show a decrease and a shifting of exploration activity because of the approaching rainy season.

Pan Venezuelan Oil Co.: Concessions were acquired at the February 1957 offering in the Gulf of Paria, South Monagas,

TABLE 1 — EXPLORATORY WELLS IN VENEZUELA IN 1957

State/Operator	Well Name	Classification Before	Classification After	Field or Area	Basis for Location	Final Depth (ft.)	IP in b/d — Gravity
ANZOATEGUI							
Creole	PGC-1	NF	Dry	Capacho	SS	6333	Abd
	2	NF	Dry	"	"	7443	Abd
	3	NF	Dry	"	"	7505	Abd
	4	NF	Susp	"	"	7539	To be abd
Mene Grande	Zarza-1 (ZG-201X)	NF	NFD	Gtr Oficina	Seis	13653	500 b/d, 39.4°
	Orla-1 (OG-435X)	NP	NPD	" "	"	6700	125 b/d, 20.4°
	Menestra-1 (MG-301X)	NF	NFD	" "	"	5200	150 (est), 12.0°
	Mecha-1 (MG-351X)	NF	NFD	" "	"	5407	150 (est), 15.4°
	Ira-1 (IZ-351X)	NF	Gas	" "	"	7019	Gas well
	Miga-1 (MG-401X)	NF	NFD	" "	"	4900	150 (est), 13.7°
	Meon-1 (MG-501X)	NF	NFD	" "	"	4900	175 (est), 12.8°
	Mermá-1 (MG-601X)	NF	NFD	" "	"	5150	150 b/d, 12.6°
	Samán-1 (SG-450X)	NF	NFD	" "	"	12131	370 b/d, 40.7°
	Osario-1	NF	Gas	" "	"	6817	Gas well
	Zulus-1 (ZM-401X)	NF	NFD	" "	"	13649	663, 29.8°; 566, 42°
	Merceros-1 (MS-701X)	NF	NFD	" "	"	5300	150 (est), 13.8°
	Elenas-1 (ES-301X)	NF	NFD	" "	"	5253	175 b/d, 32.8°
	Yelos-1	NF	Dry	" "	"	5100	Abd
	Sombras-1	NP	Dry	" "	"	10353	Abd
	Gruas-1 (GM-850X)	NF	NFD	" "	"	9201	200 (est), 13.7°
	Gramas-1 (GS-750X)	NF	NFD	" "	"	9049	210 b/d, 19.5°
	Olfatos-1 (OS-701X)	NF	NFD	" "	"	4600	50 (est)
	Mergos-1 (MS-701X)	NF	NFD	" "	"	5010	125 b/d, 11.2°
	CPM-1X	NF	Dry	Gtr Urica	Seis/Str D	6850	Abd
SAPLM	Guaribe 1.1	NP	NPD	Unare-Zurón	Seis	6651	n/a
	2.1	NP	NPD	" "	"	5625	n/a
	3.1	NP	Dry	" "	"	5504	Abd
	5.1	NF	Dry	" "	"	5810	Abd
	Dragal 4.1	NP	Dry	" "	Seis/SS	6808	Abd
	5.1	NF	Susp	" "	" "	6304	
Sinclair	Güere-67	NP	Dry	Güere	Seis	8501	Abd
Socony	North Anaco-1	NF	Susp	North Anaco	Seis/Geol	14082	
	W Cachama-2	NF	NFD	West Cachama	" "	8569	66 b/d, 25.5°
	La Freitera-1	NF	NFD	La Freitera	" "	14546	1704 b/d, 41°
	Galán-1	NF	NFD	Galán	" "	11692	636 b/d, 34.2°
	Güico-73	NF	NFD	Güico	" "	8349	792 b/d, 44.9°
	74	NF	NFD	"	" "	8377	42 b/d, 26.7°
	75	NF	NFD	"	" "	8363	432 b/d, 39.9°
	76	NF	NFD	"	" "	8756	264 b/d, 26.8°
Texas	Mata 14.1	NP	NPD	Mata	Seis/SS	11600	2351 b/d, 31-34°
	1.6	NP	NPD	"	" "	11280	212 b/d, 34.2°
	13.5	NP	NPD	"	" "	10825	
	5.22	NP	NPD	"	" "	12310	1047 b/d, 31°
	Rincón 8.1	NP	Dry	Rincón Largo	Seis	9000	Abd
	9.1	NP	Dry	" "	Seis/SS	9343	Abd
	Chaparrito 4.2	NF	Dry	Chaparrito	" "	7853	Abd
	5.1	NF	NFD	"	Seis	7720	300 b/d, 32.3°
VARCO	Pelayo-15	NP	NPD	Pelayo	SS	7501	364 b/d, 24.1°
BARINAS							
Sinclair	Sinco-39	NP	NPD	Sinco	Seis	9367	n/a
	40	NP	NPD	"	"	9356	n/a
Socony	Silvestre-17	NF	NFD	Silvestre	Seis/Geol	10267	n/a
	21	NF	Dry	"	" "	10223	Abd
	Candelaria-1	NF	Dry	"	" "	10913	Abd
	Maporal-1	NF	Susp	"	" "	10999	
	Palmita-1	NF	NFD	"	" "	10770	n/a
DELTA AMACURO							
Texas	Texas 14.2	NP	Dry	Tucupita	Seis/SS	6406	Abd
VARCO	Capure-1	NF	Dry	Capure	Seis/SS	10003	Abd
	2	NF	Dry	"	Geol	3152	Abd
	2A	NF	NFD	"	"	5364	412 b/d, 22.1°
FALCON							
Texas	Tiguaje 1.28	NF	Dry	Tiguaje	Geol/SS	4000	Abd
	8	NF	NFD	"	" "	4500	n/a
	6	NF	Susp	"	Geol	2700	
GUARICO							
Phillips	GOPA-2	NF	Dry	Valle de la Pascua	Seis	9303	Abd
SAPLM	Punzón 17	NP	NPD	Punzón	Seis/SS	5375	131 b/d, 31.6°
	23	NP	NPD	"	Seis	5100	164 b/d, 28.1°
	24	NF	Dry	"	"	3700	Abd
	25	NP	Dry	"	"	5250	Abd
	27	NP	Dry	"	Seis/SS	3700	Abd
	T8	NP	Susp	"	" "	5140	
	Piragua 19	NF	NFD	"	Seis	4100	83 b/d, 37.2°
	Mercedes 424	NP	Dry	Las Mercedes	"	5097	Abd
	428	NP	NPD	" "	"	5351	14 b/d, 52.2°
	431	NP	NPD	" "	SS	5953	72 b/d, 30.9°
	435	NP	NPD	" "	Seis/SS	4860	97 b/d, 32.6°
	440	NP	NPD	" "	SS	6759	112 b/d, 26.5°
	441	NP	Dry	" "	Seis/SS	4425	Abd
	442	NP	Susp	" "	Seis	4425	
	448	NP	Dry	" "	"	4150	Abd
	449	NP	Dry	" "	"	4700	Abd
	451	NP	Susp	" "	Seis/SS	6350	
	453	NP	NPD	" "	SS	4450	198 b/d, 33.4°
	458	NP	NPD	" "	Seis/SS	4746	194 b/d, 25.0°
	Palacio 149	NP	NPD	Palacio	" "	3517	124 b/d, 32.0°
	155	NP	Dry	"	Seis	3775	Abd

State/Operator	Well Name	Classification Before	Classification After	Field or Area	Basis for Location	Final Depth (ft.)	IP in b/d — Gravity
	Guavinita 34A	NP	Dry	Guavinita	Seis/SS	4000	Abd
	Belén-15	NF	Dry	Belén	Seis	4000	Abd
	Dakoa 16.5	NP	Dry	Dakoa	"	5150	Abd
	16.6	NP	Dry	"	Seis/SS	5143	Abd
	Valle 3.1	NF	NFD	Valle	Seis	6870	n/a
	13.7	NP	Dry	"	Seis/SS	2460	Abd
	17.14	NP	Dry	"	" "	3450	Abd
	17.24	NP	Dry	"	" "	4800	Abd
	Zurón 2.1	NF	Dry	Unare-Zurón	Seis	7005	Abd
MONAGAS							
Creole	Q-634	NP	NPD	Quiriquire	SS	11397	n/a
	MR-12	NP	Dry	Manresa	"	6339	Abd
	JOC-8	NP	NPD	Jobo	Seis	4404	n/a
	PGQ-4	NP	Dry	Cachipo	SS	9241	Abd
	5	NP	Dry	"	"	8927	Abd, mech.
	6	NP	Dry	"	"	9210	Abd
	IM-2	NP	Dry	Isleño	Seis	4069	Abd
	JX-10	NF	Dry	Jusepín	"	14812	Abd
	Cachipo-2 (PGQ-1)	NF	NFD	Cachipo	SS	8608	Abd, mech.
	JX-11	NF	Dry	Jusepín	Seis	7014	Abd
	PGL-2	NF	Dry	El Lirial	SS	6753	Abd
	ORC-14 (PGM-1)	NF	Dry	Orocual	"	5100	Abd
	E Marón-4	NF	Dry	East Marón	"	12012	Abd
	PGQ-7	NF	Susp	Cachipo	"	8009	To be tested
	PGL-1	NF	Dry	El Lirial	"	8006	Abd
	PGQ-9	NF	Dry	Cachipo	"	8009	Abd
Mene Grande	Bosque-1	NF	Dry	Gtr Sta Bárbara	Seis	6581	Abd
PanVenezuelan	MONA-11-1	NF	Susp	S Monagas	Seis	5710	
	11-2	NF	Dry	"	"	5667	Abd
Sinclair	Aguasay-4	NF	NFD	Aguasay	Seis	13632	862, 38.4°; 762, 36.6°
VARCO	Oritú-13	NF	Dry	Orituano	Seis	6627	Abd
	13A	NF	Dry	"	"	8500	Abd
	15	NF	Dry	"	SS	9204	Abd
	BX-49	NF	Dry	"	"	7600	Abd
	BX-55	NF	NFD	"	"	7500	310 b/d, 10.8°
	BX-93	NP	Dry	"	"	7766	Abd
	201	NP	NPD	"	"	8702	407 b/d, 31.2°
	203	NP	Dry	"	"	8505	Abd
	3-1	NF	Dry	"	Seis	10003	Abd
	Pirital-2	NF	Susp	Pirital	Seis/Geol	2504	
	3	NF	Dry	"	" "	2502	Abd
	4	NF	Dry	"	" "	3501	Abd
ZULIA							
Colón	T-190X	NF	NFD	Tarra	Seis/SS	2872	182 b/d, 19.4°
	T-210X	NP	NPD	"	" "	6979	2564 b/d, 31.1°
Creole	LL-962	NPT	Dev	Lagunillas	SS	8800	1209 b/d, 27.4°
	B-289	NP	Dry	Bachaquero	"	7717	Observ.
	B-397	NP	Susp	"	"	9998	To be abd.
	UD-30	NP	Dry	Urdaneta	"	12429	Abd
	B-411	NP	Dry	Bachaquero	"	11001	Abd
	UD-31	NP	Dry	Urdaneta	"	9572	Abd
	B-415	NP	NPD	Bachaquero	"	9610	249 b/d, 18.8°
	UD-32	NP	Ext Susp	Urdaneta	"	9066	To be comp.
	LL-980	NP	NPD	Lagunillas	"	12142	2706 b/d, 34.6°
	UD-33	NP	NPD	Urdaneta	"	9567	n/a
	B-427	NP	Susp	Bachaquero	"	8449	To be abd.
	B-432	NP	Susp	"	"	11765	To be tested
	B-435	NP	Susp	"	"	8935	To be abd.
	B-443	NP	Susp	"	"	9124	To be abd.
	UD-39	NP	Dry	Urdaneta	"	9455	Abd
	LL-988	NP	Dry	Lagunillas	"	10994	Abd
	Alturitas-4	NP	Susp	Alturitas	Seis	11402	To be compl
	B-462	NP	Dry	Bachaquero	SS	9690	Abd
	LL-1003	NP	Susp	Lagunillas	"	8113	To be tested
	Alturitas-5	NP	Susp	Alturitas	Seis	12183	To be comp.
	B-464	NP	Susp	Bachaquero	SS	10475	
	CL-1	NF	NFD	Lake Mcbo	Seis	12856	
	CLA-2	NF	NFD	" "	"	13929	
	CLA-4	NF	Susp	" "	SS	13385	To be abd.
	UD-41	NF	NPD	Urdaneta	Seis/SS	9590	n/a
Mene Grande	Ceuta 1 (75-Z-1X)	NF	NFD	Lake Mcbo	Seis	10766	n/a
	76-Y-1X	NF	Susp	" "	"	12560	
	6-Y-1X	NF	Susp	" "	"	13040	
	11-Y-1X	NF	Susp	" "	"	14066	
Richmond	Z-22K-1	NF	Susp	Urdaneta	Seis	8500	
	Z-20C-1	NF	Dry	Perija-N Macoa	"	4473	Abd
	Z-22D-1	NF	Susp	Urdaneta	"	9948	
	Z-46G-1	NF	Dry	"	"	10483	Abd
San Jacinto	Marlago-1	NF	NFD	Lake Mcbo	Seis	13332	5760 b/d, 27.1°
Shell	VLD-192	NP	NPD	Lake Mcbo	Seis/SS	12086	2685 b/d, 25°
	VLC-190	NP	Susp	" "	" "	8947	
	VLE-196X	NF	Susp	" "	Seis	13038	
	MG-745X	DPT	Susp	Mene Grande	"	10821	
	VR-1X	NF	Dry	Villa Rosario	"	13024	Abd
Signal	Centro 1X	NF	Susp	Lake Mcbo	Seis	9470	
	2X	NF	NFD	" "	"	12779	2400 b/d, 42.9°
Superior	Lama-1	NF	NFD	Lake Mcbo	Seis	8353	1572, 30.6°; 1426, 30.1°
	5	NP	NPD	" "	"	8946	7656 b/d, 35.7°
	6	NP	NPD	" "	"	8176	6739 b/d, 37.0°

TABLE 1 — EXPLORATORY WELLS IN VENEZUELA IN 1957 (Contd.)

State/Operator	Well Name	Classification Before	Classification After	Field or Area	Basis for Location	Final Depth (ft.)	IP in bd/ — Gravity
Ven. Sun	Timoteo-2	NF	Susp	Lake Mcbo	Seis	13004	
	SVSX-1	NF	NFD	" "	"	13700	548 b/d, 31.7°
	SLG-12-1X	NF	Susp	" "	"	13521	

SUMMARY

Oil	68	Zuila	49
Gas	2	Anzoátegui	48
Abd	68	Monagas	32
Susp	36	Guárico	31
		Barinas	7
		Delta Amacuro	4
		Falcón	3
Total	174	Total	174

Source: Bull. Am. Assn. Petroleum Geol., July 1, 1958

ABBREVIATIONS

IP — Initial production
NF — New field
NP — New pool
NFD — New field discovery
NPD — New pool discovery
Susp — Suspended
SS — Subsurface geology
Seis — Seismic
Seis Str/D — Seismic stratigraphic drilling
n/a — Not announced
Abd — Abandoned
Mech. — Mechanical
Observ. — Observation

and in the state of Apure, along the Colombian border. In addition, Pan Venezuelan Oil Co. also acquired interests with Venezuelan Atlantic Refining Co. et al. in Barinas, and with Venezuelan Sun Oil Co. et al. in Lake Maracaibo. Pan Ven's present net interest holding is 219,666 acres in 15 concessions. Two of the three tracts awarded to Pan Ven in South Monagas were acquired jointly with Venezuelan Sun Oil Co.—the latter holding a ⅓ interest in these two concessions.

The majority of Pan Venezuelan's activities carried out during 1957 were seismic operations in the Gulf of Paria, Delta Amacuro, and South Monagas. These seismic programs were joint programs in association with other operators in Venezuela. In addition to the above programs, Pan Venezuelan also joined other operators in seismic coverage in the Gulf of Venezuela, Lake Maracaibo, Barinas basin, and eastern Monagas.

Pan Venezuelan Oil participated in air magnetometer coverage in the Gulf of Venezuela and Gulf of Paria and part of the Barinas-Apure basin, and in gravity-meter coverage in Lake Maracaibo, Gulf of Venezuela, and Gulf of Paria.

Drilling activities were initiated in the latter part of 1957 on the concessions in South Monagas. Two dry exploratory tests have been drilled with Venezuelan Sun Oil Co. on jointly owned tracts, while seven wells have been drilled on Pan Ven's wholly owned concession adjacent to Creole's Jobo field. Five of these wells are one mile or longer extensions to the Jobo field.

Important flowing oil recovery from Pan Ven's second and fifth Jobo field wells has been reported recently. Mona J-2 and Mona J-5, located in Block 11, Monagas, were completed in the upper and lower Oficina zones. The J-5, first flowing well completed by the company in the Jobo field, flowed from the upper Oficina at an initial rate of 1,816 b/d of 14.6-gravity oil. Maximum flow was 2,200 b/d through a 1½-in. choke; minimum was 440 b/d through a ¼-in. choke. Upper perforations covered the interval 3,562 ft to 3,658 ft—with top pay at 3,560 ft. In the lower Oficina, the J-5 produced an average 480 b/d of 8.5-gravity oil on the pump from the interval 4,060 ft to 4,150 ft. The lower Oficina was topped at 3,792 ft. The J-5 is Pan Ven's fifth productive extension well in the Jobo field. It was spudded last February; drilled to 4,200 ft; plugged back to 4,150 ft.

Mona J-2 recovered oil from the upper Oficina at maximum flowing rate of 985

TABLE 2 — SOCONY-MOBIL EXPLORATORY DRILLING NOVEMBER 1957 - MARCH 1958 INCLUSIVE

State	Well	Type of Prospect	Total Depth Ft.	Results	STATUS (1) Susp.	Drilling	Shut In	Producing	Abnd	Spudded	Completed
EASTERN DIVISION											
Anzoategui	N. Anaco-1	N.W. flank San Joaquin Anticlinal trend	14,082	Merecure B, Colo M2 and Colo K flowed condensate at rates 38, 51 and 42 B/D respectively through 12/64-20/64 chokes.	X					25 Mar 57	15 Dec 57
Anzoátegui	Guario-201 (Ex Debajo-1)	Seismic-mapped anticline below Guario thrust	13,243	Completed single zone from Colo A, 629 B/D, 41.4 grav. oil, 20/64 choke, 1550 psi, 1236 GOR, 0.5 BS&W.				X		13 Aug 57	15 Jan 58
Anzoátegui	N. Cachama-6	Seismic-mapped fault	9,501	Open hole test recovered salt water. No other prospects.					X	12 Jan 58	14 Feb 58
Anzoátegui	Largo-1	Seismic-mapped fault				X				26 Jan 58	
Anzoátegui	Bucaral-1	Seismic-mapped fault				X				9 Mar 58	
WESTERN DIVISION											
Barinas	Palmita-1	Seismic	10,792	Oil Producer			X			1 Sept 57	20 Nov 57
Barinas	Estero-1	Seismic	10,882	Oil Producer			X			1 Oct 57	13 Jan 58
Barinas	Calzada-2	Seismic	9,935	Abandoned					X	20 Dec 57	22 Jan 58
Barinas	Calzada-3	Seismic	11,225	Abandoned					X	27 Jan 58	5 Mar 58
Barinas	Calzada-4	Seismic	9,491	Abandoned					X	7 Mar 58	27 Mar 58
Barinas	N. Sn Vicente-1	Seismic	6,876	Abandoned					X	12 Jan 58	5 Feb. 58
Barinas	Rosalia-1	Seismic	10,910	Abandoned					X	26 Jan 58	29 Mar 58
				TOTALS	1	2	2	1	6		

(1) Status as of 31 March 1958

b/d of 14.5-gravity oil through a 1½-in. choke, and minimum of 214 b/d on ¼-in. choke. Top of the upper Oficina was 3,400 ft, and recovery was from the interval 3,400 ft to 3,465 ft. Recovery averaged 480 b/d of 8.5-gravity oil on the pump. Producing interval was 3,745 ft to 4,070 ft—with top of pay at 3,732 ft. Total depth of the J-2 is 4,521 ft; plugged back to 4,413 ft. Mona J-5 and J-2 are one mile apart.

Pan Venezuelan's 1958 exploratory program provides for continued seismic work in South Monagas and Delta Amacuro, plus a reconnaissance seismic program over the border concessions in the state of Apure, along the Colombian border.

Pan Venezuelan is a subsidiary of Pan American Petroleum Corp. which, in turn, is the producing affiliate of Standard Oil Co. (Indiana).

Phillips Petroleum Co.: Exploration activities in Venezuela during the past year and for the months ahead center on the company's partnership operations covering newly acquired concessions which were awarded at the Venezuelan government sale held in the spring of 1957.

An outstanding oil discovery was made early in 1958 on the 25,000-acre Lot 10 tract in Lake Maracaibo. The discovery well, the LSG-O-1, on final production test from the Eocene formation, produced 4,080 b/d of oil through a ¾-in. choke. A 1,200-meter southeast stepout to the discovery has reached a depth of 11,998 ft (as of May 5).

A second exploratory well, the LSG-16-2, nine miles east of the discovery on Lot 10, is drilling below 12,633 ft. The Lot 10 concession is owned 45% by Phillips Petroleum Co., the operator; 25% by San Jacinto Petroleum Corp. and associates; 10% by El Paso Natural Gas Products Co.; 10% by Western Natural Gas Co.; 5% by Sunray Mid-Continent Oil Co.; and 5% by Pacific Petroleums Ltd.

On a 25,000-acre tract, 12 miles west of Lot 10, Phillips (as operator for another group of partners) has abandoned LPG-1-1, first exploratory well in Lot 17, Lake Maracaibo, at a total depth of 14,450 ft. Seven miles to the south, the second exploratory well on this block, LPG-13-2, is drilling. The Lot 17 concession is owned 55.7555% by Phillips Petroleum Co.; 17.2662% by Sunray Mid-Continent Oil Co.; 10.7913% by Ashland Oil and Refining Co.; 5.3957% by Kerr-McGee Oil Industries Inc.; 3.2374% by Western Natural Gas Co.; 3.2374% by El Paso Natural Gas Products Co.; 3.0000% by Pacific Petroleums Ltd.; and 1.3165% by Canadian Atlantic Oil Co. Ltd. The Lot 17 group also owns the 25,000-acre Lot 9 concession in the southern Monagas area of eastern Venezuela, where exploratory drilling is planned for the immediate future.

Adjacent to the Colombian border, in the states of Zulia and Tachira, Phillips, as operator, is conducting a joint gravity-meter survey on the three 25,000-acre "Frontier Exploration" tracts which were acquired in connection with the Lot 10 and Lot 17 groups' exploitation concessions.

Creole wildcat near Caripito, state of Monagas, northeastern Venezuela (Creole photo).

Richmond Exploration Co.: In 1957, Richmond's exploratory activities in western Venezuela included 12 party-months of surface geologic mapping in the states of Falcon and Lara, east of Lake Maracaibo, as well as 12 party-months in the Acosta region of eastern Falcon. Geophysical activity consisted of 1½ crew-months of reflection and refraction seismic surveying in the eastern part of the Barinas basin.

Wildcat drilling in 1957 was intensified over the previous year, and six exploratory tests were drilled. Two of these wells were abandoned as dry holes, and three are presently suspended producers. A deep Cretaceous test on the San Jose dome, located near the Perija Mountains west of Maracaibo, was spudded late in 1956 and drilled during the entire year 1957. The well is being tested to determine its productive capacity after plugging back to 15,978 ft from total depth of 16,237 ft.

During 1958, Richmond plans—with several other companies—to conduct gravity and seismic operations in central Lake Maracaibo. A gravity survey will also be

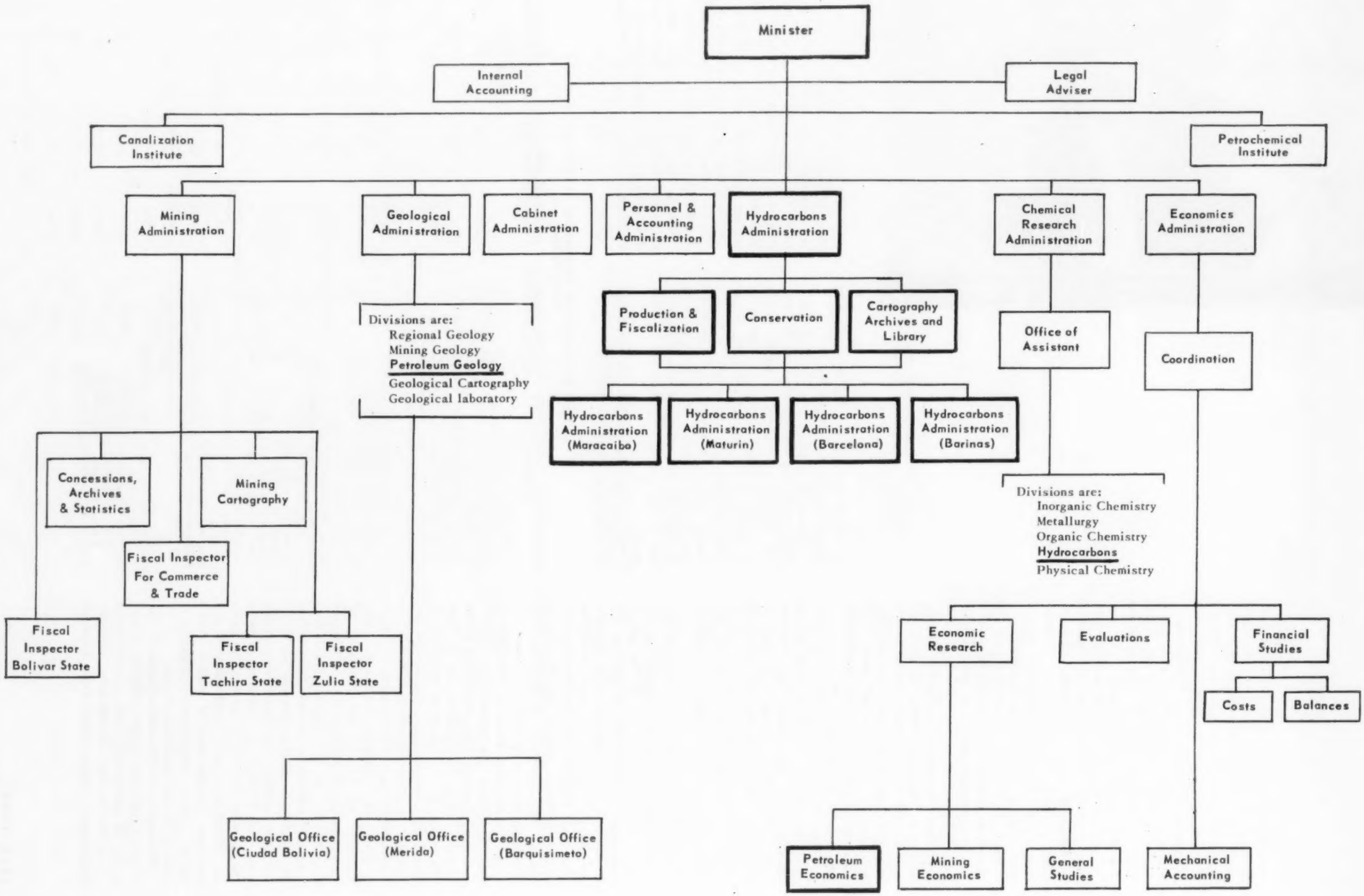
(Continued on page 99)

Table 3—VENEZUELAN GEOPHYSICAL ACTIVITY 1957
(Party-Months)

COMPANY	SEISMIC LAND COMPANY-CONTRACT		SEISMIC MARINE COMPANY-CONTRACT		GRAVITY LAND COMPANY-CONTRACT	
Caracas Petroleum CA	—	1.0	—	—	—	—
Continental Oil Co. of Venezuela	—	9.0	—	1.7	—	—
Creole Petroleum Corp.	24.0	19.5	—	10.0	24.0	10.9‡
Mene Grande Oil Co.	24.0	—	—	1.4	—	—
Pancoastal Petroleum Co. CA	—	—	—	—	—	—
Phillips Petroleum Co.	—	6.8	—	.4	—	—
Pure Oil Co. of Venezuela	—	—	—	—	—	—
Star Oil Co.	—	—	—	—	—	—
Venezuelan American Independent Oil Producers Assn.	—	—	—	—	—	—
Venezuela Leaseholds CA	—	—	—	—	—	—
Richmond Exploration Co.	—	1.7	—	—	1.0*	—
Cia. Shell de Venezuela Ltd.	—	1.1	—	1.7†	—	—
The Colon Development Co. Ltd.	—	—	—	—	—	—
Signal Oil & Gas of Venezuela	—	—	—	5.0	—	—
Sinclair Oil & Refining Co.	—	17.0	—	—	—	—
Socony Mobil Oil Co. of Venezuela	12.0	6.0	—	—	—	—
The Superior Oil Co. of Venezuela	—	24.0	—	1.0	—	—
SA Petrolera Las Mercedes	—	—	—	—	—	—
Pantepec Oil Company CA	—	—	—	—	—	—
International Petroleum Co. Ltd.	—	—	—	—	—	—
Talon Petroleum Co. CA	—	2.0	—	—	—	—
Texas Petroleum Co.	—	12.0	—	1.0	—	3.5
Venezuelan Cities Service Petroleum Corp.	—	—	—	3.0	—	—
Venezuelan Atlantic Refining Co.	—	32.5	—	—	—	—
Pan Venezuelan Oil Co.	—	26.0	—	5.5§	—	—
Venezuelan Sun Oil Co.	—	1.0	—	—	—	—
	60.0	159.6	—	30.7	25.0	14.4

Note: No magnetic marine surveys undertaken.
* Plus 1.7 gravity marine (contract).
† Plus 3.4 gravity marine (contract).
‡ Plus 1.4 magnetic land (contract).
§ Plus 1.0 magnetic land (contract).
Authority: Socy. Exploration Geophysicists

VENEZUELA'S MINISTRY OF MINES AND HYDROCARBONS



VENEZUELA'S OIL MINISTRY

MINISTER
Dr. Carlos Perez de la Cova

DIRECTOR
Dr. Gustavo Thery Fombona

CONSERVATION
Dr. Luis Plaz, Head

PRODUCTION
Dr. Domingo Noriega Salazar, Engineer
(*Dr. Luis Jacobo Cordero,* Head)

CARTOGRAPHY & ARCHIVES
Dr. Abel Monsalve, Head

One of the most capable and impartial groups of government oil administrators in the world directs Venezuela's oil development. As the following review indicates, each of them is technically trained and experienced. Below the minister are four major administrators—each trained and with many years of experience.

over ➧

At the top of the towering Simon Bolivar Center, marking 1,000 meters above sea level, is the office of Dr. Carlos Perez de la Cova, Minister of Mines and Hydrocarbons. His duties include the overall supervision of the ministry's functions and of the oil industry, and for these he is eminently suited. A review of his experience shows the depth of his oil experience. Born in Caracas, April 27, 1904, he graduated as a bachelor in philosophy and letters in Caracas, and later received his doctorate in physics and mathematical sciences, at the Central University of Venezuela, in Caracas, in 1928. He was engineer of the technical staff of Compañia Cartogràfica Venezolana (1928-30), field inspector in various oil fields in the state of Zulia, and acting field inspector of the state of Zulia (1930-37).

Dr. Perez was director of hydrocarbons in the Ministry of Development on two occasions (1937-39 and 1942-43); he was specially commissioned by the ministry, and went to the United States to make technical and economic studies of the oil industry during 1939-42. He then attended the universities of Oklahoma, Tulsa, and Colorado, and earned a petroleum engineering degree at the University of Tulsa in 1942.

He was a member of the commission, presided over by General Isaías Medina Angarita, President of Venezuela, which drafted the 1943 Law of Hydrocarbons. As head of the technical department of concessions and cartography of the technical bureau of hydrocarbons of the Ministry of Development, he was in charge of the technical study and supervision of the adaptation and conversion of all hydrocarbons concessions granted before the 1943 law; and took a very active part in the petroleum reform of that year.

From April 1945 to April 1950, he was chief of the land department and member of the operating committee of Phillips Petroleum Co., in Caracas. In 1946 he was appointed, by the ministers of foreign affairs and development, as a member *ad-honorem* of the Hydrocarbons Commission, which was part of the Venezuelan-Colombian Commission set up to study the possibility of combining the respective laws of customs and hydrocarbons in general. In 1950, he was appointed Counselor of the Venezuelan Embassy in Great Britain, with the rank of minister, by the Junta Militar de Gobierno; and later, as a member of the Venezuelan Commission, he attended the meeting of the Petroleum Commission of the International Labor Organization held in Geneva, Switzerland in 1950.

From January 2, 1952 to February 25, 1958, he was Minister Counselor of Petroleum Affairs for the Venezuelan Embassy in Washington, D.C., where he represented the Venezuelan government, in particular the Ministry of Mines and Hydrocarbons, at the meetings of the Interstate Oil Compact Commission, together with other officials of the ministry, and has attended many other technical meetings in the United States and Canada.

Dr. Perez is a member of the "Colegio de Ingenieros" de Venezuela, and a member of the Institute of Petroleum, of London. He was awarded the "Orden del Libertador," as Commander, in 1943; and made a Grand Officer of the same order in 1954.

He has written numerous articles on the various aspects of the petroleum industry—including an exceedingly clear exposition of Venezuela's views—in the July 1, 1957 issue of *World Petroleum*. By Executive Order No. 60 of February 24, 1958, Dr. Perez de La Cova was appointed, by the Junta de Gobierno, Minister of Mines and Hydrocarbons.

Hydrocarbons Administration: Below the ministerial level is a permanent staff of civil servants who have spent their careers in the oil industry. At the head of the government's Hydrocarbons Administration is Dr. Gustavo Thery, who has spent his entire working life in the Venezuelan oil industry—over a quarter century. Under Dr. Thery, the Hydrocarbons Administration is composed of seven large groups—three of them in Caracas, and four in the interior: (1) the Production and Fiscal Division; (2) Conservation Division; (3) Division of Cartography, Library, and Archives, located in the Caracas office; (4) Hydrocarbons Inspection, at Maracaibo; (5) Hydrocarbons Inspection at Barcelona; (6) Hydrocarbons Inspection at Maturin; and (7) Hydrocarbon Inspection, at Barinas, located in the interior of the country.

Functions of Dr. Thery in the Hydrocarbons administration are: (1) to prepare and render to the minister an account of the matters handled by the administration; (2) to carry out orders by the minister; (3) to handle the inquiries formulated by the minister; (4) to watch for the compliance with all legal provisions and regulations, both administrative and of a technical nature, which have been or may be dictated regarding the industry, and to call attention to whomever may violate them; (5) to suggest whatever measures it believes should be taken for the proper development of the hydrocarbons industry for the benefit of the country, of the industrialists, of their employees, and of their workeds; (6) to coordinate all the functions of the divisions of production and finance, of conservation, of cartography, library and archives, and of hydrocarbons inspection; (7) to preside over sessions of the Technical Council on Hydrocarbons.

Dr. Thery's qualifications suit him admirably for the high position of responsibility he holds. Born in Caracas, December 19, 1913, he holds the degree of bachelor of philosophy and a doctorate in physical sciences and mathematics from the Central University of Venezuela. His career in oil began August 15, 1932, when he started in the General Hydrocarbons Technical Inspection office of the Ministry of Development—rising later to become an engineer there. He was a professor, at Venezuela's Central University, in engineering law during 1936; and from 1943 to 1953 served as head of the technical department for production and finance of the Technical Office of Hydrocarbons in the Ministry of Development.

Dr. Thery attended the Tulsa petroleum exposition in 1948, as Venezuela's delegate; and later served as president of Venezuela's delegation to the First Mexican Technical Petroleum Convention. He graduated to his present job in 1951, as technical director of the Hydrocarbons Administration. He also was president of the Venezuelan delegation to the Third World Petroleum Congress, at the Hague, during 1951; vice president of the National Petroleum Convention, in Caracas, during 1951; and president of the Venezuelan delegation to the Fourth World Petroleum Congress, in 1955, where he also served as vice president of that congress.

Dr. Thery holds the decorations of Knight Commander in the Order of the Liberator (Venezuela) and Knight Commander of the Order of Merit (Peru).

Conservation Division: One of the principal divisions of the Hydrocarbons Administration is conservation, which concerns itself, as its name implies, with problems relating to oil and gas conservation in the petroleum industry. Conservation's area of influence extends to exploration, refining, transportation and, eventually, marketing.

The principal problem of the division is to find specialized personnel—chiefly, petroleum engineers with enough experience. In order to help this situation, the ministry is studying, at the present time, an intensive program for scholarship in local universities and also in universities in the United States.

In order to handle and clear matters foreign to the field of conservation (besides those specified in Article 100 of the Regulations of the Hydrocarbons Law) such as the compilation of data relating to superficial explorations, the study and authorization of transportation rates for oil and gas lines, etc., the division has administrative employees—including three engineers at Caracas, besides three other engineers located in various parts of the country; two geologists; one economist specialized in conservation matters; one section chief; four estimators; four correspondents, of whom two are bi-lingual; and two officers.

At present, the conservation division is divided into four sections: (1) oil deposits; (2) drilling; (3) statistical; and (4) secretary's office and archive.

Oil Deposits Section: This office—with a chief engineer in charge—has its central office at Caracas, with three professionals in engineering specialized in that field and three others located in the areas of Maracaibo, Barcelona, and Maturín. It also has a correspondent to prepare reports in languages other than Spanish.

The duties of the section are technical supervision with respect to exploitation systems of oil and gas deposits; conservation measures; technical study of projects

(Continued on page 102)

Superior's derrick barge No. 4, erecting the first of three permanent flow stations on its "Lama" concession. The flow station, seen here, is almost completed. Note the two extra aluminum jackets for drilling platforms on the barge tied up along the left side of derrick barge No. 4. Engineers of J. Ray McDermott & Co. and Reynolds Metals Co. worked together to design these offshore structures which incorporate the structural strength of steel with the corrosion resistance of aluminum, through aluminum template which shielded steel piles from the water and provided under-water lateral bracing, with no contact between the steel and aluminum. This was done by a design feature using insulating spacers made of steel and rubber in the four legs and in the center conductor guide. A second step was grouting of the annulus between the aluminum and the steel legs to maintain physical separation between the two dissimilar metals. The existence of a potential difference of about three-tenths volt has been determined to indicate that no electrical contact exists between the piling and the template. Shorting of the steel pile to the aluminum template would reduce the potential to zero.

An independent's view of Maracaibo —*Superior's story*

A new offshore venture in the lake is a tremendously expensive and risky procedure. The most successful of the newcomers here tells his story

VENEZUELA'S first oil concession was granted in 1878; and in 1914, with the increasing demand for fuel, the country's first oil production began. No concessions were granted during the decade following 1945, and it was not until 1956 that the oil industry in Venezuela attained marked growth.

In 1956 the Venezuelan government invited bids for additional concessions on a sealed-bid basis. Companies which had been operating on prior leases competed for additional concessions as well as renewals of their then-current leases; and many independent oil producers, some new to Venezuela, entered the competition, and were successful in their bidding.

The Superior Oil Co. of Venezuela, a wholly owned subsidiary of The Superior Oil Co., was granted a concession in Venezuela's Lago de Maracaibo. The company dubbed its concession "Lama," a contraction of the words Lake Maracaibo.

The new concessions granted the oil producers in Lake Maracaibo are all for deep-water drilling; and Superior's L-shaped lease of 7,776 acres, located just slightly north of the middle of the pear-shaped lake, attains a depth of 90 ft. The floor of the "Lama" lease is flat and covered with a layer of soft silt. Salinity of the lake's waters reaches 1,150 ppm, and the ambient temperature of the water ranges from 85 F to 88 F.

Few people realize the risk involved in putting a concession such as this one into operation. Even though Superior had maintained a small staff, engaged in geophysical and exploratory operations, in Venezuela for 10 years prior to the granting of the new concessions by that country's government, the risk involved was still extremely high and almost incalculable. This type of undertaking could easily drain the resources of even the larger independents, tie up working capital, and hamper a company's growth for many years. . .then, there's always the possibility that the concessions will be dry.

The Superior Oil Co. moved into Venezuela with all of the heavy equipment generally used in most marine operations, such as a 200-ton Gulf-type crane barge and an 1,800-hp ocean-going tug. This was a sizable investment at the outset. At that time, The Superior Oil Co. bought "The Lama," its own Lake Maracaibo type drilling tender, which was designed along the lines of the drilling tender Creole had developed, and which was found to be the most efficient for this type of operation. Creole was very helpful in cooperating with the company along these lines.

The first step in setting up permanent operations for The Superior Oil Co.'s Lama lease was to construct a base of operations; so, long before the first exploratory well was spudded, a large dock and extensive marine terminal had been constructed. The docking area of the terminal was extended 1,150 ft. beyond the original shore line into the lake to form three sides of a rectangle. This design was employed because it would provide ample wharfage space for tieing up marine equipment, and allowed for less dredging to reach the desired navigable water depth, and at the same time enabled the utilization of the excellent sandy clay soils by using them as fill inside the retaining walls. A *T*-shaped all-concrete cargo pier was constructed to extend out into the lake from the wharf. The leg of the *T* measured 300 ft. long; and the head, which extends across the front of the wharf, runs for a distance of 615 ft. Anticipating a corrosion problem, the company constructed its pier and wharfing facilities of reinforced cast concrete.

Facing the highway and a good distance behind the dock area, Superior built its modern two-story stucco and tile main office building which has a cafeteria, bachelor quarters, and an auxiliary office building adjacent thereto. There are also neat and well kept warehouses, mechanical repair, and welding shops along with additional maintenance and storage facilities necessary to the operation of the Lama lease. The installation is known as the company's San Francisco Marine Terminal, and it is situated on the southern edge of San Francisco, a small town just south of the city of Maracaibo, and almost 30 miles north of the

Lama lease. Future plans of the company include a school building, top-quality restaurant, auditorium, infirmary, and administration buildings, with additional machine shops and oil-field facilities in the dock and industrial areas of the terminal.

The use of Lake Maracaibo-type drilling tenders in conjunction with a small rig platform has become the standard method for drilling in all except the shallow shoreline areas in Lake Maracaibo. Nearly all of the more recent Lake Maracaibo drilling tenders have regular barge-type bulls 180 ft. long, by 70 ft. wide, by 11 ft. deep. Superior's drilling tender "The Lama" is this size. It is equipped with two National Ideal Model No. B-1,000 *B* mud pumps driven by three radiator-cooled Superior model No. PTD 58 supercharged 8-cylinder diesel engines through a modified National Type *B* drive group with Gyrol fluid couplings and air clutches. The engines are mounted on shear-type rubber shock mounts to reduce transmission of vibrations and to reduce stresses in the engine bed plate and foundations. The drive group includes a two-speed section for each of the pumps, as well as a synchroninzing clutch for locking the two pumps together out of phase so as to dampen the pressure surges when operating the two pumps in parallel. In addition to the two main mud pumps, there is a National Model No. C-250 mud-mixing pump. The mixing pump is independently powered by a radiator-cooled Superior model PTD-6 naturally aspirated 6-cylinder engine through a torque converter. A somewhat novel feature is the lubrication of the packing gland on these pumps by an electrically-timed air-actuated automatic lubricator.

Two active mud tanks are located in the hull of the tender. Other hull tanks used for storage include a potable water tank, two diesel-fuel storage tanks, four reserve mud tanks, and a cooling-water tank.

A pedestal-mounted 30-ton mariner revolving crane with 75 ft of boom is located near the forward end of the pipe racks so it can reach both the pipe racks and the derrick floor. Other equipment on the drilling tender "Lama" includes two 100-kw generator sets, welding machine, electric mixers, and other usual auxiliaries.

The roof of "The Lama" was designed for use as a heliport. Airconditioned quarters—including sleeping facilities to accommodate 12 people—a galley, and an office are located at the forward end of the heliport. "The Lama" is held in position at the drilling platform by five 10,000-lb anchors, each on 2,000 ft of 1¼-in. galvanized cable. Four of these anchors are positioned off the corners of the tender, while the fifth is positioned off the aft end of the tender to insure against its getting into the drilling structure during rough weather.

In addition to the Ideal model 110 drawworks and its Gyrol fluid-coupled drive group with Superior Model PTD-8 engines, other equipment installed on the derrick platform includes an 80-gal blowout preventer accumulator with both electric and air-driven pumps and with electric remote controls for operating the preventers from the drilling tender in case of emergency. A standard 30-ft base 136-ft-high derrick is mounted on a 19-ft-high four-post trussed-type galvanized substructure, with trussed cantilevered section for supporting the drawworks and drive groups on the side opposite the *V*-door. The substructure for the derrick and rig machinery sets on a pile-supported 30-ft x 30-ft platform with a deck 8 ft to 19 ft above the water. Up to the present time Superior has drilled on only single-well platforms; however, their plans call for twin- and possibly triple-well platforms.

The corrosive conditions encountered in Lake Maracaibo are considered to be worse than those of most marine operations; and, even though some of the older structures in the lake were constructed of steel, the trend has been to employ platforms constructed from materials less susceptible to corrosion. It has been estimated that Lake Maracaibo's corrosiveness will render a structure of ferrous metals useless in about five years. A protective coating was applied to the steel structures, but proved unsatisfactory because of damage to the coating by marine organisms. Cathodic protection also proved unsatisfactory because the low salinity of the lake's waters made it an undesirable electrolyte, requiring a tremendous amount of impressed current to make a cathodic system work satisfactorily and economically. Three to four times the current requirements are needed in Lake Maracaibo as compared to the Gulf of Mexico. Sacrificial anodes used for cathodic protection proved uneconomical, since a satisfactory anode pile would reach the proportions of the structure itself.

More recent platforms have been constructed of concrete or a combination of concrete and structural steel. The first structures built by The Superior Oil Co. were the all-concrete type. Twelve single-well structures of this type were ordered. The platforms for these structures were supported by eight 36-in.-diameter concrete pilings which were driven into the lake bottom until adequate bearing was obtained. Four of these piles were driven vertically as support piles, and the other four driven diagonally as batter piles. All eight of them were centrifugally cast prestressed cylindrical concrete piles with wall thicknesses of 5 in. After being driven, they were cut off at the proper elevation and capped with a reinforced cast-concrete deck section.

As drilling on the first well progressed, it became increasingly apparent that more versatility than was being rendered by these concrete structures would be needed.

The prefabricated concrete structures had to be set piece by piece into the lake, and the weight of the material limited the size of each component when striving to maintain ease of handling. Nor was this the only limitation: Each concrete section which was cast needed time to age before it could be set into place. Also, test sites had to be determined far in advance, and

Superior's drilling tender "The Lama" and rig on location at one of the company's wells on its "Lama" concession near the middle of Lake Maracaibo: Note the cantilevered trussed-type platform area of the derrick and the machinery substructure supporting the drawworks drive group on the well platform, as well as the 30-ton pedestal-mounted revolving crane near the end of the pipe racks on the tender.

by Joseph G. Davis

JOSEPH G. DAVIS joined The Superior Oil Co. the first of 1958—as assistant to the president, in charge of public relations. Prior to this, Mr. Davis had been with *Time* Inc. for nine years. Mr. Davis handled automotive and oil advertising for *Time*, in New York, prior to moving to the West Coast in 1953 as West Coast manager.

Superior's San Francisco marine terminal on the west side of the lake just south of the city of Maracaibo: The main office building adjoining the highway is visible in the upper fringe of the trees in the upper right-hand corner of the dock area. The oblique area of cleared land in the left central area of the photo is part of the terminal allocated to the administration area.

test pilings had to be driven to determine the length to which each piling had to be fabricated. Generally speaking, 25 days were required for the construction of the substructure on the drilling site.

The advantages of time, salvability, and structural rigidity of the template-type structure had long been known to The Superior Oil Co., since the company had built the first structure of this type in the Gulf of Mexico in 1947. We had but to determine a means of resisting corrosion in the lake to find a satisfactory structure for our operations.

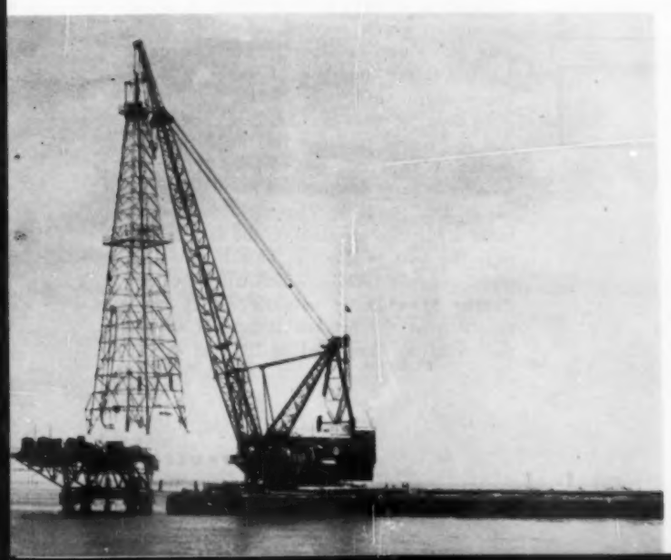
J. Ray McDermott Co., in conjunction with The Reynolds Metals Co., designed and proposed a Gulf of Mexico jacket-type steel structure with an aluminum-alloy jacket for these operations. The Superior Oil Co. was the first to utilize its possibilities, and erected on its Lama No. 2 well the first aluminum-alloy jacket structure used for drilling in Lake Maracaibo. So far as is presently known, this was the first aluminum-alloy jacket deep-water drilling structure in the world. The aluminum-alloy jacketed steel structure offers several advantages for use in Lake Maracaibo: It provides for a ready means of obtaining adequate under-water bracing and good structural stability in deep-water structures. Since it is weldable, future repairs or modifications can be made easily; and, if necessary, the steel pilings can be extended quickly in the field when driving them, thereby eliminating the necessity of a test piling and a meticulous study of the lake bottom soil conditions at the exact site of each platform location. This type structure lends itself well to prefabrication in large sections onshore, and permits stockpiling of structures which can be erected quickly when needed. It also allows a wider choice of well locations on short notice, and fuller utilization of well data and geological information from wells just completed when contemplating the selection of the next well locations. One of the most important advantages offered by this type of structure is its salvability, for it can be taken up and moved to a new location if a dry hole is drilled.

Continuing research indicates that the aluminum-alloy jacket will effectively resist accelerated corrosive conditions prevalent in Lake Maracaibo, and will provide a corrosion protective sheath for the steel piling as long as the aluminum-alloy jacket is insulated from the steel piling to avoid electrolytic or galvanic corrosion of the aluminum-alloy jacket and prevent it from becoming an anodic sacrificient to the steel. Insulation is accomplished by the use of hard-rubber insulating rings tipped with tapered-steel guide shoes and located at intervals inside the aluminum-jacket verticals through which the steel pilings are to be driven. A hard-rubber shoe is molded to the inside of each of the aluminum-alloy jacket verticals near the bottom end; and, after the pilings have been driven, the annulus between the steel piling and the aluminum-alloy jacket is carefully pumped full of Posmix cement grout. At regular intervals, The Superior Oil Co. has run field tests on its first aluminum-alloy structure to determine if there is a flow of electric current between the aluminum jacket and the steel piling. To date, these tests have indicated no measurable detrimental charge between the two. The aluminum jackets used on Superior's "Lama" lease have all been 111 ft in overall height. The corner members, or verticals through which the pilings are driven, are 34-in.-OD x $\frac{3}{8}$-in.-wall tubular members, and most of the various cross-bracing members are 12-in.-OD x $\frac{3}{8}$-in.-wall pipe. The pilings are driven with open tapered ends to an average net penetration of about 70 ft to 75 ft into the lake floor.

To date the aluminum-alloy jacket structures have brought satisfactory results. The Superior Oil Co. considers them successful, and has erected the first dual-platform production flow station of aluminum-alloy jacket construction in Lake Maracaibo. The company has additional drilling structures of this type in stock in its San Francisco terminal, and other single- and twin-well units on order.

The Superior Oil Co. has had two rigs running on its Lama lease since the exploratory drilling began. One of these is Superior's own rig and tender, "Lama"; and the other is a contract rig, Loffland Bros. rig and tender No. V-103. Both rigs are operated by Loffland Bros. of Venezuela; and all labor, drilling crews, and transportation for drilling operations are furnished by Loffland. Forty-foot steel-hull diesel-powered launches are provided for transportation of crews, and will make the trip from the terminal to the Lama lease in 2 or 2½ hours, or 4 to 5 hours' net travel time by water each day. The crews work eight-hour shifts, and are paid travel time.

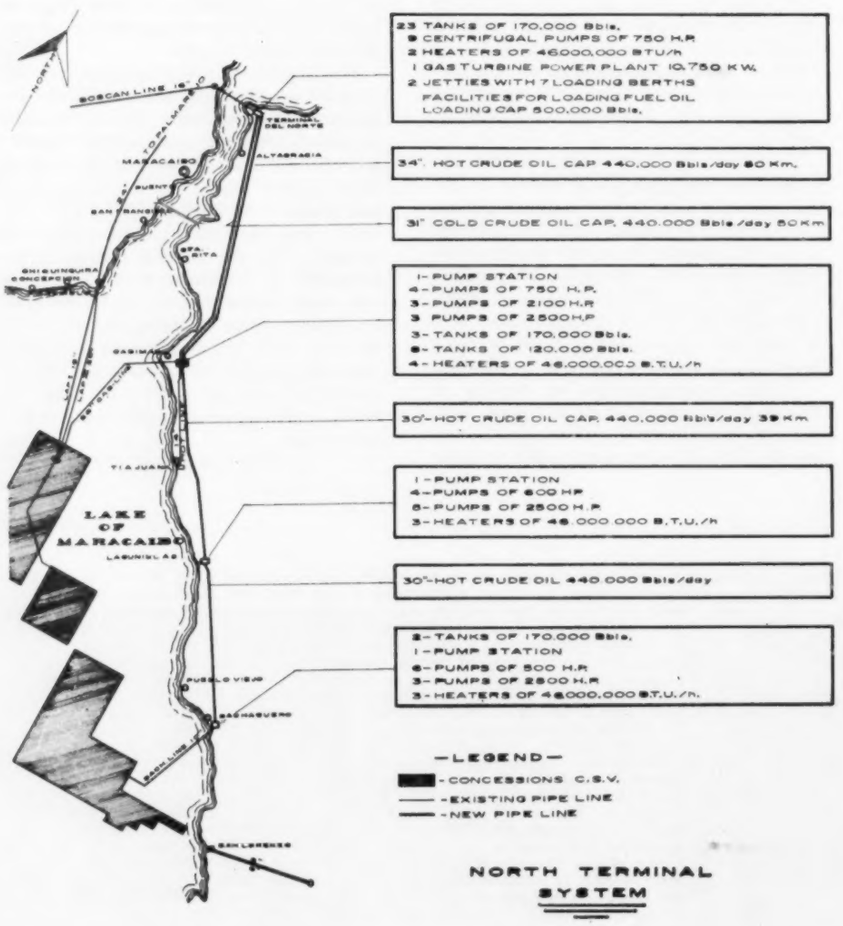
(Continued on page 104)



Superior's derrick barge No. 4 shown lifting, in one integral piece, the erected derrick (complete with all tackle string, crown block, and usual equipment) from substructure. Only two lifts are required to move the rig from one well platform to another by this method. Derrick and machinery platform with all its drilling equipment and machinery (as shown atop the well platform in the photo), constitutes the second integral lift required in moving the rig. The use of the aluminum drilling structures as designed by Reynolds Metals Co. and J. Ray McDermott & Co. is a new phase in the lake. The 7,000 drilling platforms used previously by other companies had been erected on concrete piles. In addition to the grouting used to prevent shorting of the steel pile to the aluminum template, as described in the first photo of this article, oxygen-depletion cells (stagnant-water areas) which might have been locations of accelerated attack are prevented in the McDermott template by (a) welding closed the hollow lateral bracing structurals and (b) by grouting in the annulus between the legs and the steel piles. With each of the first four structures installed, a full-length aluminum pipe (6-in. Schedule 40 alloy 6061-T6) was strung for test purposes. Linked to the bottom of the aluminum pipe was a section of 2-in. Schedule 40 bare steel pipe. The steel pipe was insulated from the aluminum by means of plastic pipe spacers and grouted in to maintain the insulation. The test pipe at Lama 2 was first checked three months after installation, and again 7½ months after installation. No evidence of significant corrosion could be found.

Shell builds big lake terminal

With the opening of Lake Maracaibo to large tankers, the companies are building extensive facilities to permit lake loading. The latest of these is the new Shell terminal at Pto. Miranda, built at a cost of $100 million.



NORTH TERMINAL SYSTEM

THE EXISTING, extensive oil transportation system in Lake Maracaibo, which has been developed over a long period of time, was from the beginning dominated by one single factor. This factor was the depth of water at the exit from the lake to the sea. At this exit, only relatively small and shallow-draft tankers could pass.

It was logical, therefore, that the gradual expansion of production in the lake basin, over a period of many years, should bring about the construction of a number of small terminals along the lake shore. These terminals were naturally built to handle tankers of appropriate small capacity and shallow draft. The system worked well. Today, however, three factors have developed which render the existing facilities less satisfactory. These factors are the completion, in 1956, of a deep-water channel at the mouth of the lake, built by the Venezuelan government; the current tendency to build larger and larger tankers; and the growing difficulties of getting to a series of small terminals, which require vessels to navigate along narrow shipping lanes through an increasing number of busy offshore concession areas.

In order to meet the changing conditions, and to provide facilities for the direct exportation of crude-oil cargoes by large tankers to their destinations throughout the world, Cia. Shell de Venezuela decided to build a suitable terminal on the lake shore, near the exit to the sea. This North Terminal Scheme (NTS), which will be called Puerto Miranda, is actually under construction at the present time, and is expected to be completed in 1960, at a cost

of approximately $100 million. The site was chosen because the port will always be accessible, even to the largest tankers; and there is room for expansion if this is required in the future.

The crude-oil transportation and handling system now being built has called for the most careful, extensive, and forward-looking study. Oil will be taken from Shell's principal production areas on the east shore of the lake (Bachaquero, Lagunillas, Tia Juana, and Cabimas), from concessions in the lake itself, and also from Shell's Boscán field on the west side of the lake. Some of the oil produced by the Mene Grande Oil Co. on the east side will also be handled. These crudes, which differ widely in physical characteristics, will be conducted by large-diameter pipelines to storage tanks at Puerto Miranda and thence shipped by the use of the most modern port facilities. It will be possible to accommodate tankers as large as 65,000 dwt.

The trunk-line system serving the east shore of the lake has been designed for a capacity of 440,000 b/d from Bachaquero to Cabimas and 880,000 b/d from Cabimas to the terminal at Puerto Miranda. To facilitate pumping at these rates necessitates the heating of the heavy crudes to a temperature of up to 190 F to reduce the viscosity to an acceptable level. The heated oil lines are placed underground with a minimum cover of 4 ft, which is the optimum depth for maximum heat conservation and for restraining the thermal expansion forces without, at the same time, infringing on the water table. The lighter oils could be pumped cold, but this is not desirable because they would cause severe thermal shock on the line and cool not only the heavier hot oils, but also the surrounding ground, and thereby increase the necessary pump horsepower required to maintain the desired pumping rate. All oils in the 30-in. line from Bachaquero to Cabimas, therefore, are heated. From Cabimas to Puerto Miranda, two lines will be laid; a 34-in. line to transport the heavy heated oils, and a 31-in. line for the lighter cold oils which will not require reheating at Cabimas.

At Bachaquero, the existing facilities are completely integrated into the new design of the North Terminal Scheme, but two additional storage tanks will have to be provided.

Under normal operating conditions, the new station will deliver at a rate of 465,000 b/d against a delivery pressure of 365 psi. The difference between the indicated delivery rate and the nominal line capacity reflects a service factor of 0.95, which is at times incorporated into the design. Three identical main-line centrifugal pumps, each rated at 465,000 b/d and driven by 2,500-hp electric motors, will be installed. Two pumps will operate in series, with the third in reserve as a spare.

In order to provide sufficient pressure at the inlet of the main-line pumps and to boost the oil through, three 46 x 10^6 Btu per hour capacity heaters and six electrically-driven centrifugal booster pumps of 500 hp each will also be installed.

At the Lagunillas station, five identical main-line pumps will operate at a pumping rate similar to Bachaquero, but against a delivery pressure of 665 psi.

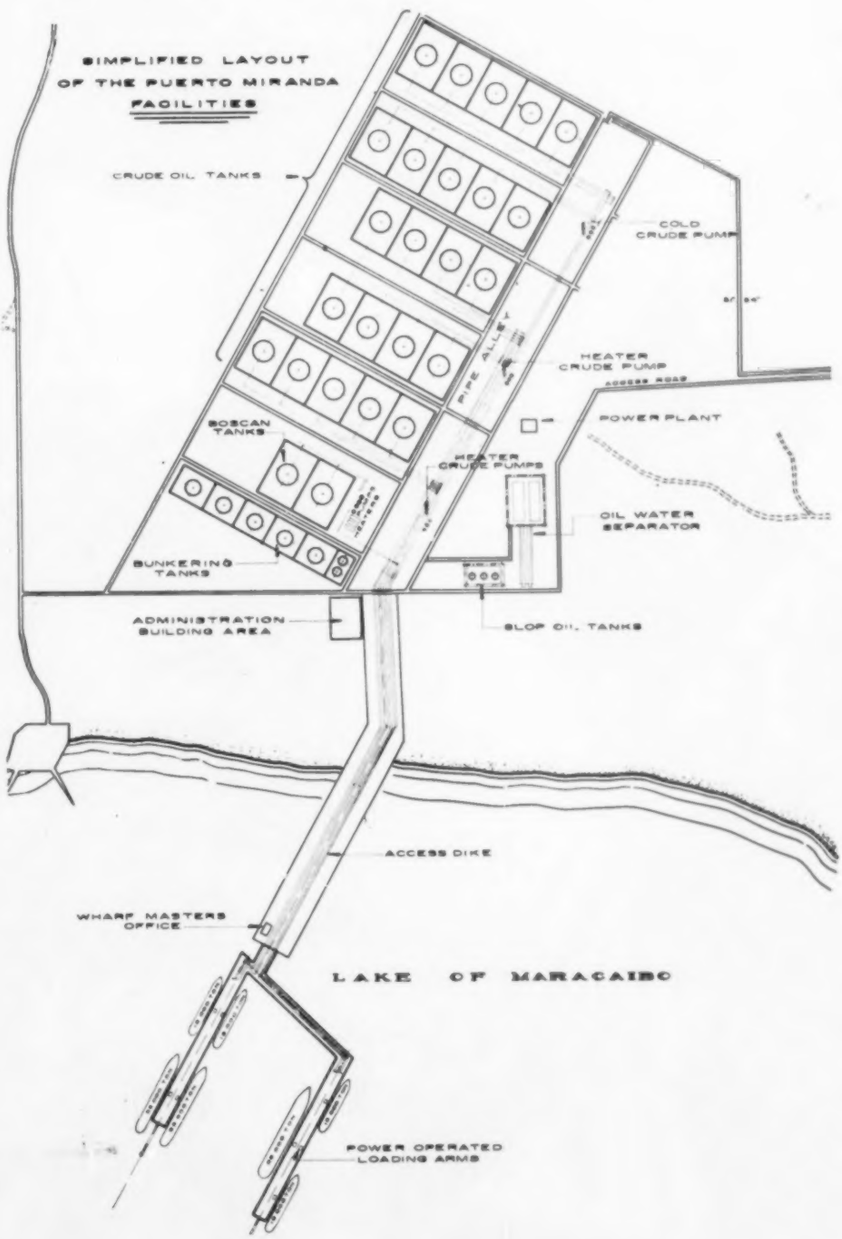
The Bachaquero crudes will arrive at Lagunillas with sufficient residual pressure to overcome the heater losses and furnish adequate NPSH for the main-line pumps. It will, however, be necessary to boost crudes from Lagunillas tank farm through three 46 x 10^6 Btu per hour heaters; and for this service, a further six electrically-driven booster pumps, each of 600 hp, will be used.

The crude oil received from Bachaquero will be pumped by the main-line pumps in closed-line procedure, without going to storage tanks. The Lagunillas pumps will, therefore, handle alternatively Bachaquero and Lagunillas crudes.

The Cabimas pump station and tank farm are located at a site situated about 8 km east of the town of Cabimas. Three 170,000-bbl and eight 140,000-bbl floating-roof tanks will provide storage for Cabimas, Tia Juana, and lake oils.

Cabimas station will, as already discussed, deliver the crude to Puerto Miranda in two lines. Rated line conditions are: 440,000 b/d at 395 psi for the 34-in.

(Continued on page 90)



How oil workers fare in Venezuela

Club Nautico, part of company recreational facilities at Maracaibo (Creole photo).

A changing community demands changing standards, and for the very prosperous oil workers of Venezuela a new formula is being devised. It will eliminate the old oil camps and substitute integrated towns—benefiting worker and company alike.

THERE IS probably no better cared for or relatively better paid group of workers in the world than those in Venezuela's oil fields. While this appears a rosy picture, it has disadvantages too. For the companies, paternalistic "womb to tomb" philosophy is somewhat of a problem. It tends to create "company towns," among other difficulties; and in an effort to get away from this, the companies have begun a new effort at making oil camps part of the community by permanently selling facilities to the workers and encouraging outside ownership of movies, grocery stores, etc. While these experiments were resisted for a time, they are gaining increasing acceptance by the workers, who are finally enabled to own their own homes and live in open communities.

Today, steps being taken toward correcting the situation include experiments already under way on the part of Creole at Judibana and Tamare, where housing is being constructed under a home-loan plan designed to permit the worker to become a home owner. There is also the concrete example of permitting local contractors, merchants, and commercial interests to become a part of the already existing field camps—thus opening them up for free enterprise and making them more in the nature of open communities. Finally, Creole, Shell, and Meneg—the three largest companies are today participating in a project which is aimed at a study of the east coast of Lake Maracaibo, from Cabimas south, to determine the requirements of the area insofar as community development is concerned. Coupled with this is the proposal for the development of a large tract made available by Shell to the Venezuelan government and on which it is proposed that a small community be developed by the Workers Bank in collaboration with the oil companies mentioned.

Venezuelan oil worker (photo by Charles P. Weimer).

For an example of oil-company philosophy, we may turn to Cia. Shell de Venezuela, oldest and second largest of Venezuelan oil companies. The company early found out that in regions of the country which are underdeveloped, and where enterprises employ large number of workers in remote areas sparsely inhabited and lacking in community facilities, a number of special problems arise in personnel administration. When oil was first produced in the inland parts of Venezuela, it was necessary to built self-contained camps to house staff and workers. These camps contained the necessary facilities such as housing, water, sewerage systems, etc. They were all surrounded by fences as a protection against damage by animals and intruders. These camps in many cases could only be reached by lake or river travel, and there were no "natural" communities of any significance near them.

At one time, it was true that a worker lived in a company house, purchased food from the company store, was married in the company church; his children were born under the care of a company nurse, and were educated in a company school; and the worker finally was buried in a company-made coffin in a company cemetery.

As more camps were built, there grew alongside the camp a community without direct employment in the company, but which depended for its livelihood on the company or its workers. Such communities were on the outside looking in, and generally did not have the facilities of the company camp.

As a result of these conditions, there was created a privileged oil-worker class without any sense of community pride and civic consciousness. As everything belonged to the company, there was little incentive to conserve things. There was no community pride outside the camp, where living conditions were minimal.

Apart from this social problem, the administrative burden of providing camp facilities became greater and greater, and a change was most desirable. Cia. Shell's philosophy since then has been one of "integration"; that is to say, the integration of existing camps with existing outside communities and the avoidance of building further camp areas, but rather integrated communities or open townships, wherever necessary.

The approach of Cia. Shell de Venezuela in areas where no local authority exists has been, first, to endeavor to create a community with civic consciousness, in both

Creole schooling at Amuay, Venezuela (photo by Charles P. Weimer).

the oil camps and the neighboring villages; and, second, to weld the two communities into one township. The first is a problem of education, and was tackled by getting oil workers to do things in their houses, clubs, etc., for themselves—showing them that people who provide their own facilities can have those of their choice, thus obtaining greater satisfaction. It was hoped that, by example, they would learn and eventually teach their neighbors outside camp. The second aspect meant extending participation in community affairs to personnel outside camp and to try for the improvement of outside facilities through "self-help" projects. It was also necessary to maintain, or even improve, the standard of living provided in the earlier camps, and at the same time to reduce the administrative burden on the company of being the only provider. Any move had to be made carefully so as to limit the natural resentment to change. The approach has been one of tackling the problems only after most careful study, but persistently bearing in mind the social changes involved—since they, of necessity, take time and are a matter of education. Below is given a summary of some steps taken.

Cia. Shell tried to develop the workers' social and moral consciousness by creating in each camp a welfare and cultural association, called "Asociacion de Bienestar y Cultura" under the initials "ABC." The ABC's were designed to run without company direction, and they are controlled by committees elected by and from members of the community. At first, little was done without direct company help; but slowly there has been progress, and both company personnel and people outside the company are taking more interest. The ABC's now provide handicraft classes, shorthand and typing instructions, primary and secondary schooling, kindergartens, domestic-science classes; they edit fortnightly newspapers, and have social workers who visit workers' houses, giving advice on family problems, etc. These services are open to camp dwellers and outsiders. Some ABC's have constructed or improved roads in the local village; they have also built bridges and children's playgrounds. These programs are based on the principle of "self-help," and participants in courses pay fees; workers and merchants contribute voluntarily, and the company contributes as an important member of the community—lending economic, physical, and moral support, rather than being the sole provider.

Another step has been that of removal of the fences in certain camps. In the city of Maracaibo, company housing was among other houses of an acceptable standard; so, by taking down the fences and constructing roads and sidewalks, these colonies have ceased to exist and have become a normal part of the city. Such facilities as electricity, gas, garbage collection are provided and charged for by the municipality of private utility companies. House rents for more senior staff in the fields are charged on a "realistic" scale, instead of being directly subsidized. Due to legal provisions, labor houses have not been affected in respect of charges for facilities, but "realistic" living is the aim for the future. Furthermore, third parties are being encouraged to provide utilities to the outside villages.

Cia. Shell used to provide clubs administered by the company, whose only members were company employees. Later these clubs were encouraged to become separate legal entities, and were handed over to the employees who elected committees to run them. It is now company policy to open clubs to the general public and, in certain areas, to sell the facilities to club members.

Sports facilities are provided by Shell in all camps—including sports fields for baseball, softball, football, and athletics; also courts for basketball and volleyball. In addition, sports instructors are employed on the company payroll. The organization or running of sports has been taken over by two ABC's, and participation has been

extended beyond purely Shell employees and teams.

There were shops and commercial buildings owned by the company, but later on plots of land—both inside and outside camps—were set aside as commercial areas. These plots were leased to businessmen who undertook to build modern shopping facilities, and today there exists in most camps a shopping center to cater to all the needs of the community. Furthermore, banks have been encouraged to set up branches near the fields, providing a facility for the community as a whole. They have already taken over the burden of loans so frequently requested in the past by workers to the company. Shell is moving towards having the salaries of all monthly-paid employees deposited in these banks—thus encouraging saving. Commissaries still run as a collective contract obligation, but ways and means are being studied whereby they will either be run by concessionaires or replaced by modern supermarkets owned by outsiders whose business will be to give a much wider service to the general community than an oil company can provide.

A modern, airconditioned hotel and a motel are being constructed by third parties, and they will supplant two of Shell guest houses. What were formerly Shell mess halls in the camps have been rented to concessionaires, who operate them as public restaurants open to all. It seems that private capital can be attracted to provide modern facilities in and around an oil center on a competitive basis.

Integration of schooling for workers' children is one of the most difficult tasks. Company schools cannot be opened to the general public due to the ever-increasing number of company employees' children and the very large number of children in outside communities. Ever since Shell's schools were built, they have expanded; and every year the company is faced with adding more classrooms and hiring more teachers.

In one of the fields, Shell has handed over the school to a religious order, and it provides education to all the community on a fee basis. The company pays a fixed charge only for each company child attending; outsiders pay for their own children.

Another field which is being rapidly opened up by integration is "home ownership"; and, although to a great extent this is still in the planning stage, it is the intention to give every encouragement for a worker to construct his own house in the local community.

It is possible to visualize that within, say 10 years, the company will no longer be the sole provider of the essential amenities of life in these areas. Employees will live in either their own houses or rent houses belonging to third parties. Schools will be opened to the children of the community in general, and company employees will have a choice according to their preference. Services will be provided by municipalities or private utility companies, and charged for realistically. In other words, there will be just towns and no more camps. However, this must be achieved without lowering the high standards enjoyed by the workers of the company, and by projecting these standards into the surrounding community at reasonable costs, borne by those who will most benefit. Cia. Shell believes that its gradual but persistent approach is the long-term permanent solution.

Direct Worker Benefits: In accordance with collective contracts, the minimum wage in the oil industry is Bs 20 ($US 6) per day. Exception is made of apprentices who earn slightly less than this amount. The average daily base rate per effective working day for labor in the oil industry is Bs 26 ($US 8) per day. In addition to this average base rate for actual work performed, the workers are provided a paid day of rest each week, and receive nine official holidays per year with pay. In accordance with the Labor Law, they are entitled to a minimum vacation annually of 15 working days. This has been amplified by union agreement to provide annual vacation for workers having less than five years of service of 29 calendar days, and for those having more than five years of service of 30 calendar days, with the right on the part of the worker to return to work upon conclusion of the required days of vacation provided for in the Labor Law, retaining payment for the additional days which he does not elect to take as vacation.

Siro Vazquez, a native Venezuelan who is now worldwide producing coordinator for Standard Oil Co. (New Jersey).

Vaccination in a company hospital (Mene Grande Oil Co. photo).

Oil-company recreational facilities at Club de Campo Sur, San Tome, Venezuela (Creole photo).

Community church in Creole Petroleum's Judibana development, Amuay, Venezuela.

By way of premiums, and again in accordance with provisions of existing collective contracts, transportation to and from work is provided by the company. Time required in traveling to and from the work site is compensated by the company at a premium of 25% over the base rate applicable to the worker. When this travel is performed at night, an additional premium of 20% of the base rate is also allowed. By provision of the Labor Law, work performed at night is compensated at a premium of 20% of the rate fixed for the ordinary day shift, and hours of work are reduced to 7½ hours for a so-called mixed shift—not more than one-half of which is worked after 7:00 pm—and to 7 hours for a regular night shift, four hours or more of which are worked after 7:00 pm. The regular day shift is limited to 8 hours. In addition to these payments which the worker receives, there are certain other types of premium payments, such as time and one-half for overtime, Sunday premium pay, and special premiums applicable to specific categories of workers. Where housing is not furnished, a premium in lieu thereof is paid.

CASH EARNINGS—AVERAGE VENEZUELAN DAILY WAGE WORKER —PER DAY WORKED*

	Average Worker	
	Venezuelan Currency	U.S.$ Equiv.
Base pay	Bs 25.25	$ 7.58
Overtime	1.96	.59
Travel time	3.15	.95
Night bonus	1.03	.31
Sunday and holiday premium pay	0.80	.24
Rest-day pay	4.33	1.30
Vacation pay	2.48	.74
Thrift fund contribution	1.90	.57
Payment in lieu of housing	3.19	.96
Profit sharing	6.69	2.07
**Other payments	0.85	.26
Sub-total—Additional Earnings	Bs 26.38	$ 7.99
Total cash Earnings	Bs 51.63	$15.47

* 287 Work days per year.

** Other payments include sickness benefits, holiday pay, special premium payments and temporary cost of living allowance in Maracaibo and Caracas.

In passing, mention might be made of the fact that the base rate per effective working day for the highest category of skilled workers—that is, the driller—is Bs 43,60 ($US 13) per day. For this type of worker, all items of direct, indirect, and employee welfare expenses represent a total cost to the company of Bs 120 ($US 36) per day.

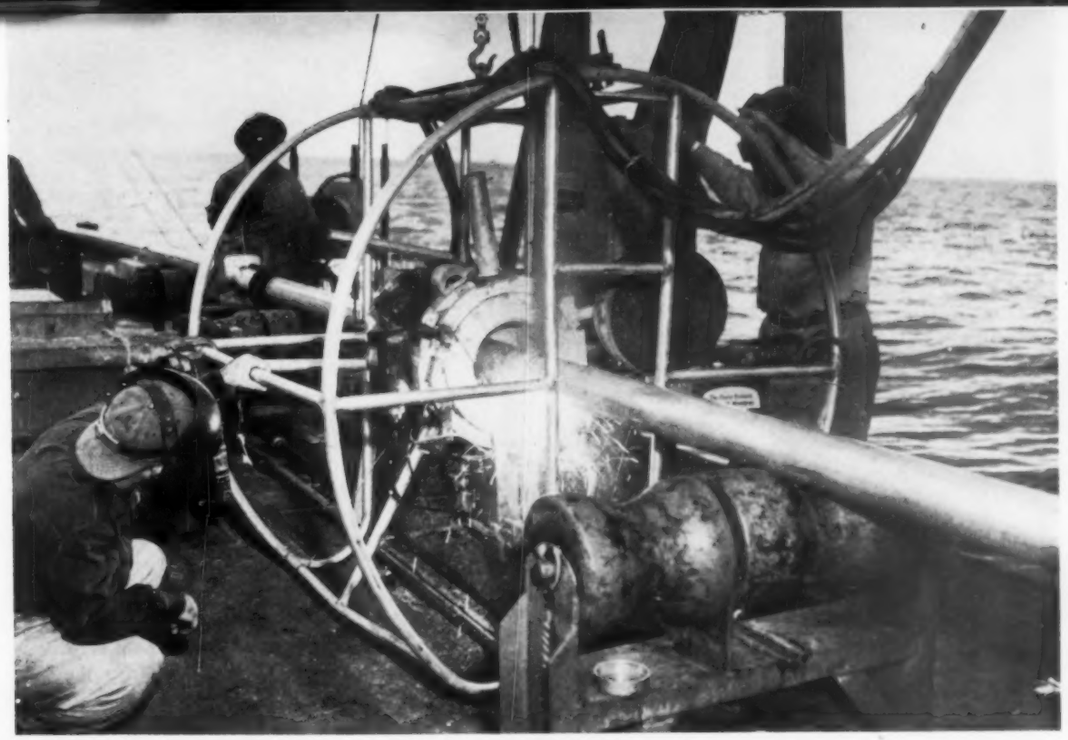
Indirect Labor Expenses: In accordance with Articles 28 and 29 of the Venezuelan Labor Law, employers are required to provide notice of termination to those workers who are discharged or otherwise laid off by the company. Generally speaking, 30 days' notice is required or payment in lieu thereof, calculated on the basis of the average earnings of the worker in the month preceding the effective day of termination. These payments are normally made in cash. In addition, in accordance with Article 37 of the law, a service indemnity of one-half month's pay for each year or fraction thereof exceeding eight months of employment is paid. Article 39 of the law provides for payment of an unemployment indemnity known as "cesantia," which is normally calculated at 15 days' salary for each year of service, with a maximum of not more than the equivalent of 8 months' salary. By collective contract, the company in addition is obliged, in those cases of discharges made by the company, to pay an additional service indemnity equivalent to ½ month's earnings for each year or fraction thereof in excess of 8 months of continuous service. Thus, when a worker is terminated by the company, he normally receives the equivalent of one month's notice in cash, plus indemnities approximating six weeks' earnings, calculated on final day, for each year of uninterrupted employment.

Another substantial premium payment is that known as "utilidades"—profit sharing. In accordance with the labor law, all employers are required to distribute to their workers 10% of their earnings at the end of each fiscal year, not to exceed a maximum of two months' salary. This represents, in effect, a payment of 16 2/3% of the earnings of the respective worker during the fiscal year. It is customary in the oil industry to pay this bonus whether or not it may have been earned in a given company.

In addition to the foregoing, there are other types of premium payments applicable to short service workers, such as fractional vacation allowance, short service indemnity payments on discharge, etc.

Employee Welfare Benefits: In addition to what has been said above, there are a number of other welfare expenses directly applicable to the cost of finding, producing, refining, and marketing oil in Venezuela. These include such items as savings and pension plans for employees and workers, as well as group life insurance. School expense for education through the primary grades of children and nieces and nephews of the workers represents a substantial outlay. The average cost to the company per worker for operating and maintaining these schools is $12.50 per month, based on Mene Grande Oil Co. figures. The company also maintains school facilities for children of foreign staff personnel. In addition, the company maintains a scholarship program for the higher education of the children of its Venezuelan employees and workers—representing for Mene Grande an outlay of $80,000 per year. There are 40 scholarships in effect at this time under this program. Other types of training and educational programs are in effect, including the teaching of adults in night schools and language training in both English and Spanish for the employees and workers. Classroom and on-the-job training, as well as special types of training programs designed to qualify personnel for particular types of work, are also carried on.

A major item of expense provided by the company is that of giving free of charge to the employees and workers medicines, medical attention, and hospitalization—both for industrial and nonindustrial types of accidents and illnesses. Moreover, this program is extended to providing free medicines and free out-patient treatment to the wives and children of the employees and workers. Finally, hospitalization is provided to them at nominal cost. In connection with this proram, the company is committed to make up losses of pay under certain conditions for both nonindustrial and industrial types of accidents and illnesses. Finally, in those areas where social security is in effect, the company contributes substantially to the cost of providing these services in the form of a social security tax. END



On the basis of performance record of its aluminum test line, Creole Petroleum Corp. decided to lay an extensive system of aluminum under-water flow lines. To date, almost 20 miles of 4-in. Schedule 40 pipe have been laid. Welding was accomplished by an automatic pipe welder perfected by Reynolds Metals Co. and the Air Reduction Sales Co.

Pipeline research at Creole

by R. W. Leach

CREOLE PETROLEUM CORP.'s pipeline research program has as its objective the reduction of pipeline transportation costs through the development of better pipeline equipment and methods. In this effort Creole is fortunate in being associated with a pipeline research group composed of affiliated companies of Standard Oil Co. (N.J.). The research program of that group has a wide variety of projects, which are conducted by the individual companies for the common benefit of the group. Examples of two current projects being conducted by other companies are the investigation of inhibitors to reduce internal corrosion of pipelines, and the project for the development of an automatic welder for steel pipe. The following is a discussion of those projects of this program in which Creole has an active part, and of pipeline research which Creole is conducting independently.

Corrosion of Under-Water Pipelines: In terms of potential saving, the most important pipeline research project is the program for testing pipe and pipe-coating materials in Lake Maracaibo. Creole has over 1,900 miles of pipelines on the bottom of Lake Maracaibo for which the annual cost of corrosion and marine borer damage is measured in millions of dollars. In 1957, for example, $2.4 million was spent in replacing and repairing under-water lines.

In recent years, most of the under-water lines laid by Creole in Lake Maracaibo have been of steel pipe with a glass-reinforced asphalt covering applied onshore. This coating has good resistance to the lake water; however, it is easily damaged during the laying process, and it does not have good resistance to the teredo, a marine borer which thrives when the salinity of the lake water is at a high level.

The teredo of Lake Maracaibo is a wormlike slimy mollusk whose head is covered by hinged shells lined with rows of microscopic teeth. When young, the teredo is about 1/100 of an inch in diameter and free-swimming, with its body covered by tiny shells like those of a clam. It is self-propelled and soon attaches itself to some object and begins boring to protect itself from other marine life. If conditions are favorable, it continues boring and grows into a wormlike form with practically all of the body outside its shells. In contrast to other species of teredos which sometimes grow to 36 in. or more in length, this particular species in the lake environment rarely, if ever, exceeds 11 in. in length.

The teredo apparently does not eat the material in which he is boring, and adding poisons to pipe coatings has done little, if anything, to reduce damage. It appears that a successful coating must provide a barrier through which the teredo cannot bore, and tests of such materials as metal foil wraps and sand-impregnated coatings are now under way.

During the past six years, the salinity of the lake—and, therefore, the teredo population—has been low. From the standpoint of under-water line protection, this low teredo infestation rate has been very desirable; however, the testing of pipe and coatings has been hampered by the fact that test samples exposed during these six years have not been subjected to serious teredo attack. Because of this, teredos have recently been bred in captivity for use in the testing program. In regard to the future teredo population of Lake Maracaibo, it appears that the salinity of the water is now rising; and should this reach the high level of 1950, a tenfold increase in the teredo population is expected. It should be noted that the salinity of the lake varies from location to location, as well as varying with time. Essentially, the water is one part of sea water diluted with from six to 25 parts of fresh water, depending on location.

Lake Maracaibo teredos attacking wood (photo, courtesy Creole Petroleum Corp.)

Since 1948, Creole's La Salina Corrosion Engineering Unit has completed approximately 100 exposure tests in Lake Maracaibo of all types of pipe or pipe-coating materials such as rubber, synthetic rubber, plastics, steel, copper, and aluminum. At present, in 36 separate tests, 126 different materials are being exposed to the lake environment. Most of the test samples are at the corrosion test station, roughly a mile from shore, at a well platform in 14 ft of water. The oldest of these tests—which is for synthetic-rubber-coated pipe and semi-hard-rubber-covered pipe—has been in progress since August 1948. After almost 10 years of exposure, these materials are still intact, and show no evidence of teredo penetration; however, they have not been used for a large-scale test because of their relatively high cost. Originally this test included a soft-rubber pipe coating which was removed after it had seriously deteriorated.

In these exposure tests, aluminum showed great promise as a possible replacement for coated steel pipe; and in July 1955 a test section of 700 ft of 4-in.-diameter aluminum pipe was laid in the lake. In the first two inspections of this line, it was noted that most corrosion had been uniform and some shallow pitting had occurred. The third inspection revealed small sections with deeper pits; but the pitting rate was still only one-third the rate which would be expected on steel pipe. Internal corrosion was found to be virtually non-existent.

In the fall of 1957, a full-scale test of aluminum pipe was initiated with the installation of nineteen 4-in.-diameter flow lines totaling 77,000 ft in two different areas of Lake Maracaibo. With this test it was established that, from a mechanical standpoint, it is possible to lay aluminum pipe under any of the varying conditions found in the lake at a rate comparable to the best rates for laying steel pipe. In addition, it was possible to establish the relative installed costs of aluminum and coated steel pipe. In regard to corrosion—since a large portion of these lines was laid in areas where there is the strong possibility of galvanic corrosion occurring because of contact with old steel lines or copper cables—it is believed this test will be sufficiently severe to establish the long-range economics of coated steel vs. bare aluminum pipe. This test will also attempt to evaluate the effectiveness of a phenolic epoxy paint in preventing galvanic corrosion by eliminating contact between the aluminum and any pipes or cables of dissimilar metal. The exterior of roughly 1,500 ft of pipe, including two complete flow lines, were coated with this paint.

Pumps for Viscous Crudes: Creole is particularly interested in a project being conducted in the United States by an affiliated company to improve or develop pipeline pumps for viscous fluids. The maximum efficiency obtainable for centrifugal pumps is often as low as 50% when pumping viscous crudes; and, since considerable quantities of heavy oil are being produced, any significant improvement in pump efficiency would result in large power savings. One accomplishment of this project to date has been the design of a special impeller with a modified vane angle to make it more suitable for pumping viscous crude. The efficiency of this impeller will be compared with that of a standard impeller in tests conducted at the company's Lagunillas pump station along the shore of Lake Maracaibo.

Pumpability of Heavy Crudes: Considerable research effort has been directed toward finding a means of reducing the effective viscosity of very heavy crude oil to reduce its pumping cost. In November 1956, a test was made in eastern Venezuela to determine whether water injected into a pipeline along with a viscous crude oil would form a tubular layer of water around the crude which would allow the oil to be pumped with a relatively small loss of pressure. It was found that, although at times the crude oil appeared to be surrounded by a tube of pure water, in general there was water on the bottom and sides of the oil with a water-and-oil mixture on top. The reduction in pressure loss resulting from the addition of water was very large. For example, with a flow rate of 2,000 b/d of crude flowing through the 6-in.-diameter test piping system, it was possible to reduce the pressure drop to 60 psi from 1,600 psi by adding about 33% water. One shortcoming of this method is that, if flow stops, the water settles to the bottom of the pipe and, therefore, starting the flow once again must be done very gradually to avoid exceeding the allowable internal pressure for the pipe. This results in a considerable loss of time, which would be a serious liability for a commercial pipeline.

Solar Energy: Another approach to the problem of reducing the cost of pumping heavy crude oil has been to investigate the possible use of heat from the sun to decrease crude-oil viscosity. Since the capacity of a pipeline pumping viscous crude oil is inversely proportional to the viscosity of the oil, a temperature rise which reduces the viscosity 50% doubles the capacity of the line. Fortunately, a few degrees increase in temperature can make a marked improvement in viscosity. For example, the viscosity of one low-gravity eastern Venezuelan crude can be reduced 50% with a temperature increase of only 13 F.

This solar-energy research project has thus far been principally concerned with measuring the amount of solar energy available for useful work and developing equations to represent the transfer of heat to and from a long-distance pipeline.

A solar heat absorber installed in Jusepín has given information concerning the amount of the sun's heat which is absorbed by crude oil during the day, and also what portion of this heat is lost at night or during cloudy periods. Pyrheliometers have given data concerning rate of delivery of all direct solar energy per unit of horizontal surface.

It appears that it is not possible to justify economically the installation of solar-energy heating equipment in Venezuela. However, in the case of an aboveground pipeline transporting heavy crude, it may be possible to increase the amount of the sun's heat which is retained by the crude oil by covering the line with a special coating. Such a coating would reduce the amount of heat lost to the atmosphere from the pipe without decreasing the amount of heat absorbed from the sun. A few of these coatings are already in existence, and an investigation will be made to determine if one of them is suitable for a pipeline installation. Consideration will also be given to attempting to develop a satisfactory coating in the event the existing ones are not suitable.

Computer Program for Pipeline Problems: Since at times the hydraulic and cost calculations required to make an economic study of a proposed pipeline are laborious and time-consuming when done on a desk

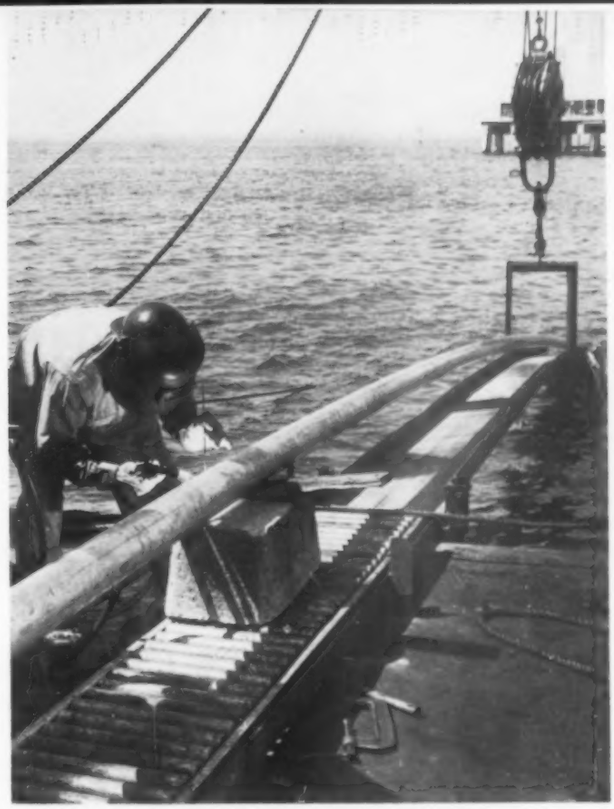
calculator, a pipeline computer program for the IBM 650 electronic computer has been prepared. This program calculates the pressure in the entire pipeline at points 1,000 ft apart—taking into account changes in elevation of the line—and makes a printed record of these pressures, which may be used in designing the line. In addition, the computer calculates and gives a printed record of the following: (1) Number of feet of pipe required for each pipe thickness; (2) tonnage of pipe required for each pipe thickness; (3) discharge pressure at each pump station; (4) horsepower required at each pump station; (5) spacing of pump stations; (6) total cost of pipe; (7) total cost of pump stations; (8) total cost of complete pipeline including pump stations; (9) total annual charges—including operating cost, depreciation, and return on investment.

Since the computer can compute the above results in roughly ten minutes for an average problem, many combinations of conditions can be analyzed in a few hours of machine time.

For any set of design conditions, the program may be run a number of times for different combinations of line diameter and number of pump stations to select the most economical pipeline, which will be the one having the lowest total annual charges. The program may then be run to select the most economical pipeline for other sets of design conditions, if desired, to show the effect on pipe diameter, total investment, and total annual charges resulting from a particular design condition change, such as increasing total desired line capacity 20%.

High-Capacity Meters: A research Project to develop a high-capacity positive-displacement meter has been essentially completed by an affiliate working with a meter manufacturer. The meter developed, which has a rated capacity of 10,000 bbl per hour, has proved to be very accurate in extensive tests; and Creole will install five of them—one of which will be used in calibrating the other four—in the La Salina terminal now being completed. Since ultimately it is planned to use meters for oil-custody transfer at this terminal, this will be in the nature of a test installation. Four of the meters will be installed in parallel to permit, under ideal loading conditions, loading a tanker at a maximum rate of 40,000 bbl per hour; and, with the future installation of 12 additional meters, it will be possible to meter simultaneously the loadings of four tankers at this rate.

With this installation, it will be possible to measure the amount of crude loaded aboard a ship by the conventional method of taking tape measurements of the level in a storage tank before and after loading and compare this amount with the reading of the battery of four meters through which the crude passes on its way to the tanker. It is believed such comparisons will clearly show the suitability of meters for providing official measurement of the amount of oil loaded, and that this will be the first step toward ultimate elimination of hand measurement of tanks at this terminal.



Pioneering tests were begun in 1949 by Creole Petroleum Corp. which started replacing corroded steel risers from flow lines with aluminum risers. The aluminum risers lasted nine years before perforation occurred, compared with three years for the steel risers—and all these failures were due to galvanic corrosion, which can be corrected. Then Creole in July 1954 installed in the lake 800 ft of experimental under-water flow line of 4-in. Schedule 40 aluminum pipe, in 30 ft of water. Efforts were made to prevent galvanic corrosion by placing the aluminum line where it would not physically contact any steel flow lines. After 21 months—whether buried in the mud or directly exposed to lake water—the aluminum line away from areas of attack was almost free of corrosion and in a state of virtually perfect preservation. At three locations of contact where galvanic corrosion had occurred, the deepest pits were 0.030-in. At these spots, indications were that insulating flanges may not have performed satisfactorily. Improved techniques are available today for insulating flanges which should solve this particular problem. Shown above is a welder attaching a concrete block to an aluminum line.

Future Projects: In regard to the future, the conviction remains that pipeline research is an effective means of reducing pipeline costs. New projects are under consideration, and increased emphasis is to be given the entire program—with a particular effort being made to increase the amount of work being conducted in Venezuela. END

Creole's installation of IBM 650 computer in Caracas office.

Socony's

Venezuelan training program

Pushed by the lack of skilled personnel and need for more Venezuelan personnel in high positions, Socony Mobil de Venezuela has undertaken a vigorous training program. It extends from the oil field through universities in Venezuela and abroad.

IN THE fast-paced economy of Venezuela, it is a fortunate company indeed which can number among its assets an adequate backlog of qualified people available for promotion, transfer, or training. The supply is limited, in the first place, by the relatively short industrial history of this nation, whose population is small. In addition, the pool of available skilled manpower is depleted daily by the spectacular influx of new industry.

As early as 1950, Socony Mobil Oil Co. de Venezuela began to feel the shortage of skilled tradesmen and the lack of graduate engineers. Accident losses were a problem, and some of the most desirable developments in oil technology were actually resisted because of their complexity. But the company had long been determined to develop its Venezuelan employees. Safe and sensible work policies had to be established and effective measures taken to train employees to man up the rapidly growing company.

To make the best of the existing situation, recruiting efforts were expanded, and a testing program was installed. The latter immediately proved valuable in helping to select persons with the requisite aptitudes to fill existing jobs, as well as to screen employees for development toward later promotion. An Industrial Trades Training School was established in 1953. Shortly afterward, the college scholarship program was enlarged so that promising young Venezuelans could be sponsored by the company in universities both in Venezuela and the United States. Safety and fire-protection efforts (already extant since 1948) were greatly increased so that solid accident-prevention performance became requisite for all supervisors, both expatriate and Venezuelan. The benefits from this move also became immediately apparent. Absenteeism was reduced, jobs were made simpler and safer, and Mobil de Venezuela has since been an industry leader in safety. The benefits from the Trades Training School and scholarship program were only slightly slower in manifesting themselves; and now, with three graduating classes from the Trades Training Center supplementing Mobil's work force, the payoff is more than comforting.

Trades Training Center: The original aim of the Trades Training Center was to provide a supply of well-trained Venezuelans in the then-scarce specialties of automobile mechanics, diesel mechanics, drilling-equipment repairmen, electricians, radio and telephone repairmen, plumbers and welders. A three-year classroom program was set up, supplemented by shop work under actual operating conditions. The theory was to bolster the young Venezuelan's knowledge of practical math, science, and mechanics; blueprint reading; English; and similar allied skills—providing first-rate classroom instructors and the most modern teaching techniques available. Models, visual aids, and lectures by factory representatives were later added, and are now mixed in a fine blend with instruction in shop practices, hand and machine-tool operation, and accident prevention. Classroom training is backed up with an opportunity for the student to "learn by doing" on real jobs in the shops and the field. The work of the early graduates, as evidenced by the comments of their supervisors, has given high hopes for the long-run success of the school. Because of the signal success of the first three classes and the large number of applicants for admission to the school, a recent addition was made to the program. Groups are now being selected for a one-year course in drilling, production, and pipeline operation, and for an additional group to prepare for work in the refinery —which will start operation in Puerto Cabello in 1959-60. The only requisite for admission to the school is that the applicant be a Venezuelan between 16 and 21 years of age; and that he be graduated from the sixth grade. All qualified applicants are given a series of aptitude tests, and trainees are selected on the basis of test results supplemented by interviews conducted by the director and staff of the center. Trainees are not required to work for Mobil when they finish their schooling; nor, in fact, are they even guaranteed a job—although, of course, they are given priority for jobs which are available at graduation.

University Scholarships: All oil companies operating in Venezuela are required by law to give a certain number of scholarships, depending on the size of the company's work force. But it became apparent to Mobil, in 1955, that the projected need for graduate engineers would greatly exceed the expected yield from this source. The scholarship program was expanded forthwith, and today the company sponsors far more scholarships than the law requires. As in the case of the employees selection program, scholarships are awarded on a competitive basis, and only

after thorough testing to determine the best possible candidates. Caracas high schools are visited in much the same way that college recruitment teams operate in the United States. All interested youths are encouraged to apply. By this step alone, so many worthwhile candidates have come to the company's attention that, in addition to sponsoring outstanding students for full scholarships for university study, an educational aid program has been instituted to give financial help to students in local universities. Post-graduate work is also offered in leading medical schools, in the USA and South America, to the company's doctors—thus enabling them to keep up-to-date in such specialties as tropical medicine, public-health medicine, industrial hygiene, and all recent developments in their field.

Not all scholarship recipients come to work for Mobil when they finish their schooling. Many go to government and public agencies, but a sufficient percentage becomes available to the company to alleviate greatly the shortage of professional Venezuelan employees. Desirable vigor is imparted to the program by the practice of awarding scholarships on a one-year basis, renewable if the student's scholastic work is satisfactory. He is also required to spend six weeks of his summer vacation either working with the company or attending summer school. Usually, the student attends summer school his first year and spends part of his vacation in following years at one of our field locations. Besides affording the student a chance to see the practical side of his studies, this work makes it easier for him to start his career after graduation with valuable on-the-job experience.

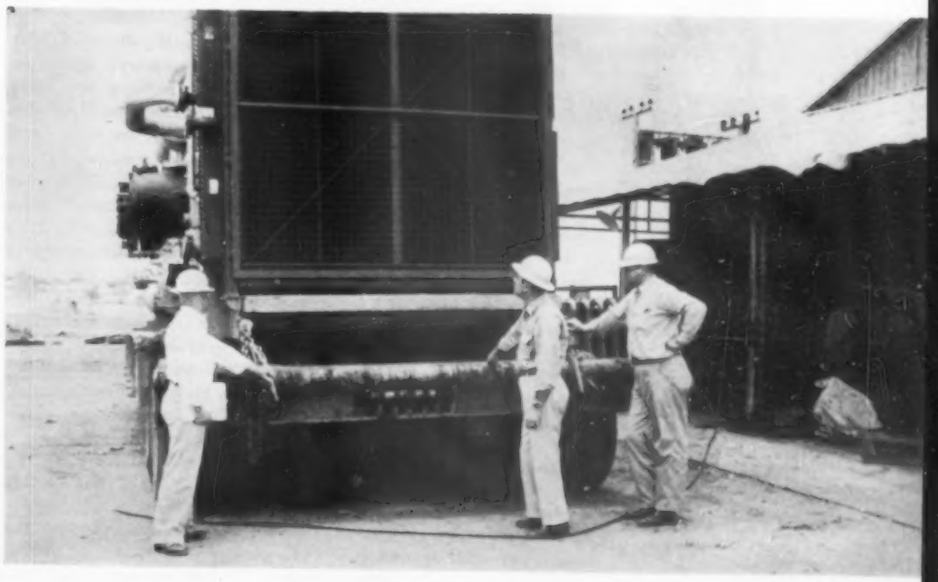
The Language Barrier: Probably more basic research has been done in the field of language training than in any other single sociological problem in the oil industry. Of course, a language barrier cannot be removed in a short time; but during the past 10 years Mobil de Venezuela has succeeded in minimizing this problem by offering Spanish courses to its expatriate employees.

The goal is to offer an *essential* knowledge of the language—the minimum which will make the language useful to the employee in his job. It is our belief that this minimum can be acquired in from 250 to 300 class-hours. A basic course of 260 hours of Spanish instruction has been offered by the company to its employees for the past three years. During this same time, improvements in teaching techniques have allowed an increase in the program's coverage to more than 80% of personnel from the previous 35%. The course is offered on an 8-hour-per-day schedule for six weeks. This year, the course is being given to all new employees *before they report to work.*

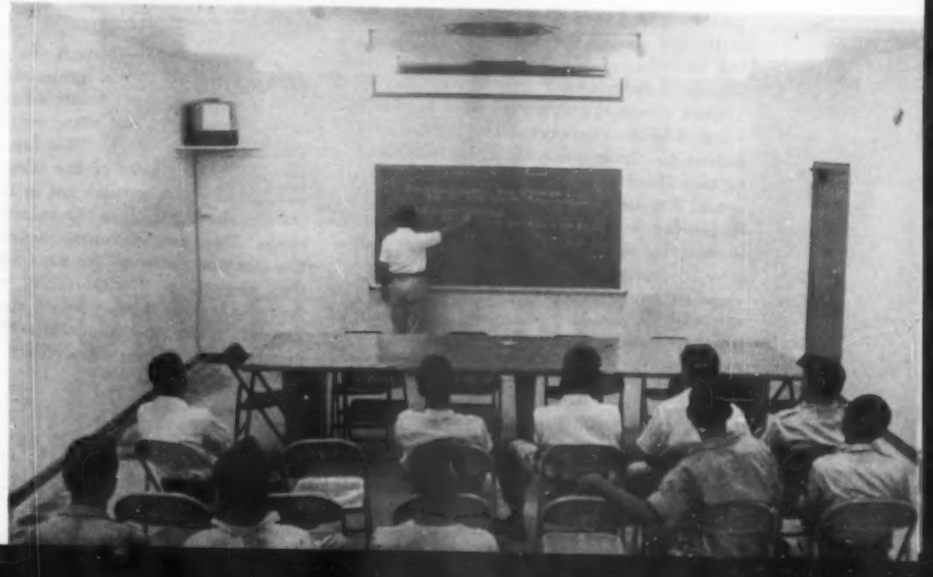
Besides intermediate and advanced courses in Spanish, Mobil plans to formalize English instruction into a similar plan: a beginner's intensive 8-week course, which will be followed by intermediate and

At Mobil's Industrial Training Center, students are taught to replace slow hand methods with modern power tools.

Inspection committees—composed of high-level supervisors—arrive unannounced as part of Mobil's supervisors safety contest.



Indoctrination of new Mobil employees is spread over the first week—culminating in a classroom session on Saturday morning.



advanced courses for those requiring them. The desire for English instruction is high among Venezuelan employees, and it is offered freely to outstanding employees whose promotion within the company would be limited without a good knowledge of English.

Other Training Methods: The company sponsors an educational refund plan, under which an employee is reimbursed one-half of the cost of any correspondence or extension work or other approved courses of study which the employee has completed. A large number of employees are completing their high-school and university educations in this way.

Full advantage is taken of all opportunities to further employees' training by sponsoring factory-taught short courses in specialized fields. Examples of these courses would run from fire extinguishment to refinery instrumentation. The use of high-speed electronic computers will become a necessity in the future for some departments. The complexity of this equipment makes it necessary that specially trained IBM representatives teach the operation and theory of electronic data processing to selected groups of employees. Several of these courses have been completed in the recent past.

Qualified employees are also encouraged to attend congresses, conventions, seminars, and similar professional gatherings, both national and international. In this way, the program seeks to inject a broader scope of thought into day-by-day operations by borrowing from, and contributing where possible, to the experience of the world.

On-the-Job Training: In field operations, one of the first considerations is to find how to do the job without risk to the personnel involved. Very little training can be accomplished until a safe, sensible, and *standard* method of doing the job can be developed. The first step in establishing this standardization of procedure is undertaken jointly between safety training and the operating section responsible for the supervision of the job. The safety considerations of a job are thus well defined at the very beginning. If later a man is measured against the job procedure to determine if he can perform acceptably, his safety knowledge of the operation is automatically included in the measurement. Moreover, if it develops that he cannot perform the job properly and needs to be instructed under the standard procedure, the inclusion of the proper safety factors are again automatic.

After standard procedures have been developed for various operations, the man assigned to those jobs must be measured against these procedures to determine his actual knowledge of the job at hand. This measuring is known as skills' inventory. It is done by the employee's supervisor, and may be discussed with the training supervisor or safety supervisor if so desired. In this way, it can be determined accurately what training is necessary to fill in the deficiencies in skills actually required for first-rate job performance by an employee.

Skills, inventory and measurement, however, should not be confused with job-progress rating, which is a method of determining an employee's actual prgoress in his job assignment with an aim to locating the most promising candidates for promotion and development. In this method, both a job-proficiency rating by the employee's supervisor and the results of a psychological test are compared. This comparison aids in overcoming a tendency to rank people on the basis of seniority, and on several occasions has turned up promising candidates for development who might otherwise have been overlooked because they had not worked very long for the supervisor.

Selecting a New Supervisor: When the above four steps—standard procedures, skills, inventory, job rating, and psychological testing—function smoothly and have been well infused with solid principles of accident prevention and conservation, the next step in developing supervisors can operate in its most favorable environment. That step is job rotation. Job rotation simply means "select the right man, let him work on enough different jobs to learn everything necessary, and then promote him." There is nothing new about rotation; there is definitely something new in *selecting the right man for rotation.*

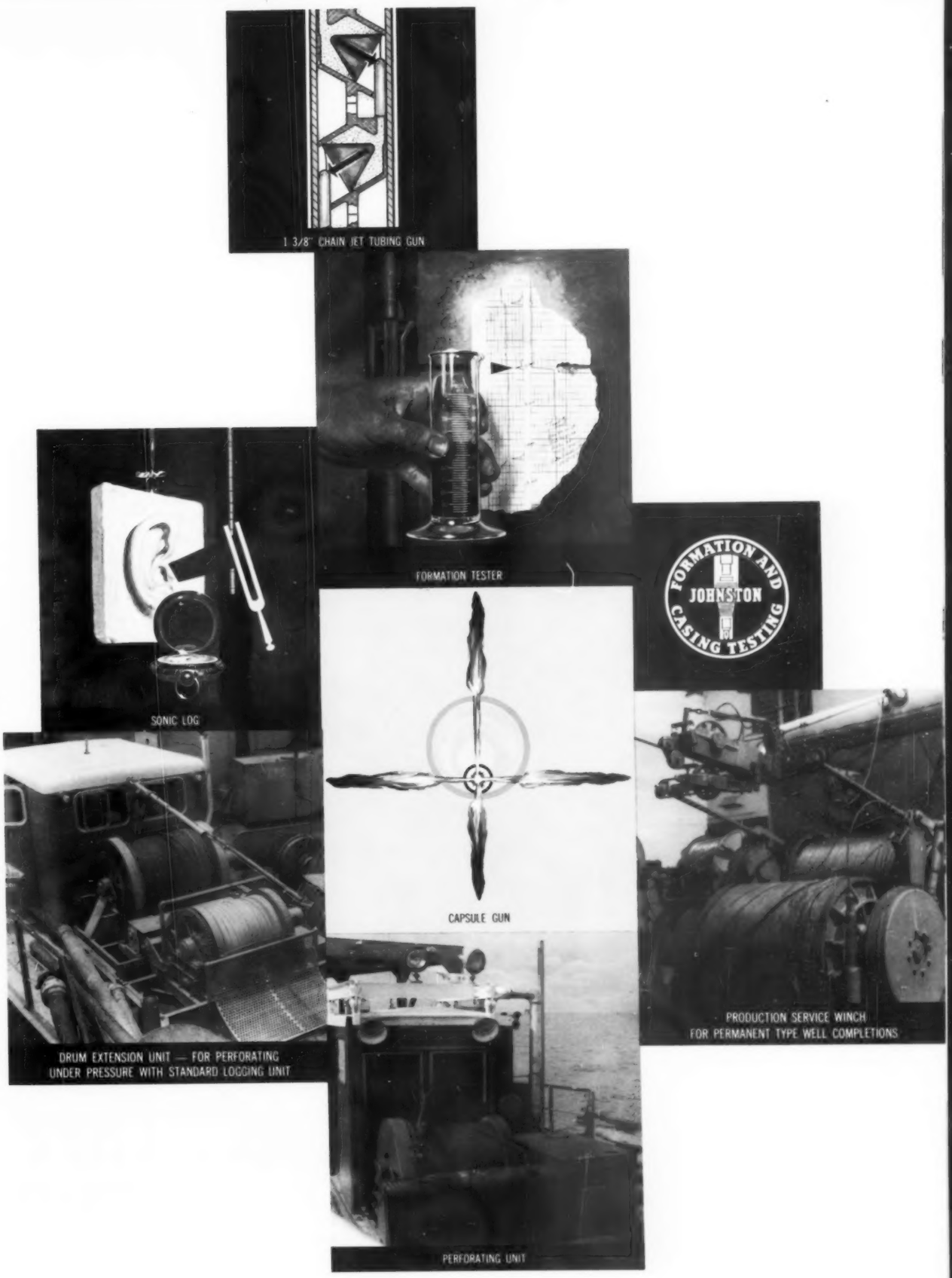
Mobil utilizes a method of progressive job ratings applied at regular intervals over a reasonable length of time. These ratings are also made by the employee's immediate supervisor, who must discuss the rating with the employee. To aid the supervisor, the employee fills out a personal history record, outlining his education and experience. The supervisor reviews this with the employee when it is originated, and also brings it up-to-date in his annual evaluation of the employee. The discussion is guided by the evaluation summary which the supervisor has completed. The summary is pointed to the positive side of the employee's performance, and the supervisor is expected to tell the employee the best points about it—what improvement has been recognized since the last rating, noting what he has done to improve himself, and pointing out specific things which he needs to do to improve himself, and pointing out specific things which he needs to do to improve still more. Wherever possible, definite plans are made to help the employee progress.

This objective approach to employee performance evaluation minimizes the possibility of a good performer's being either overlooked or, at the other extreme, falling victim of some "Monday morning grouch" on the part of the boss. The results of these ratings are not in themselves the deciding factor in the selection to be made. They are, of course, augmented by the common sense of the supervisor doing the promoting. Considerable weight is given to the employee's safety record, particularly if he is a supervisor being promoted to a higher supervisory job. Not only his own accident record, but the record of his men, is given very close scrutiny. In this way, the benefits of changing a man's job assignment can be pinpointed with relative ease.

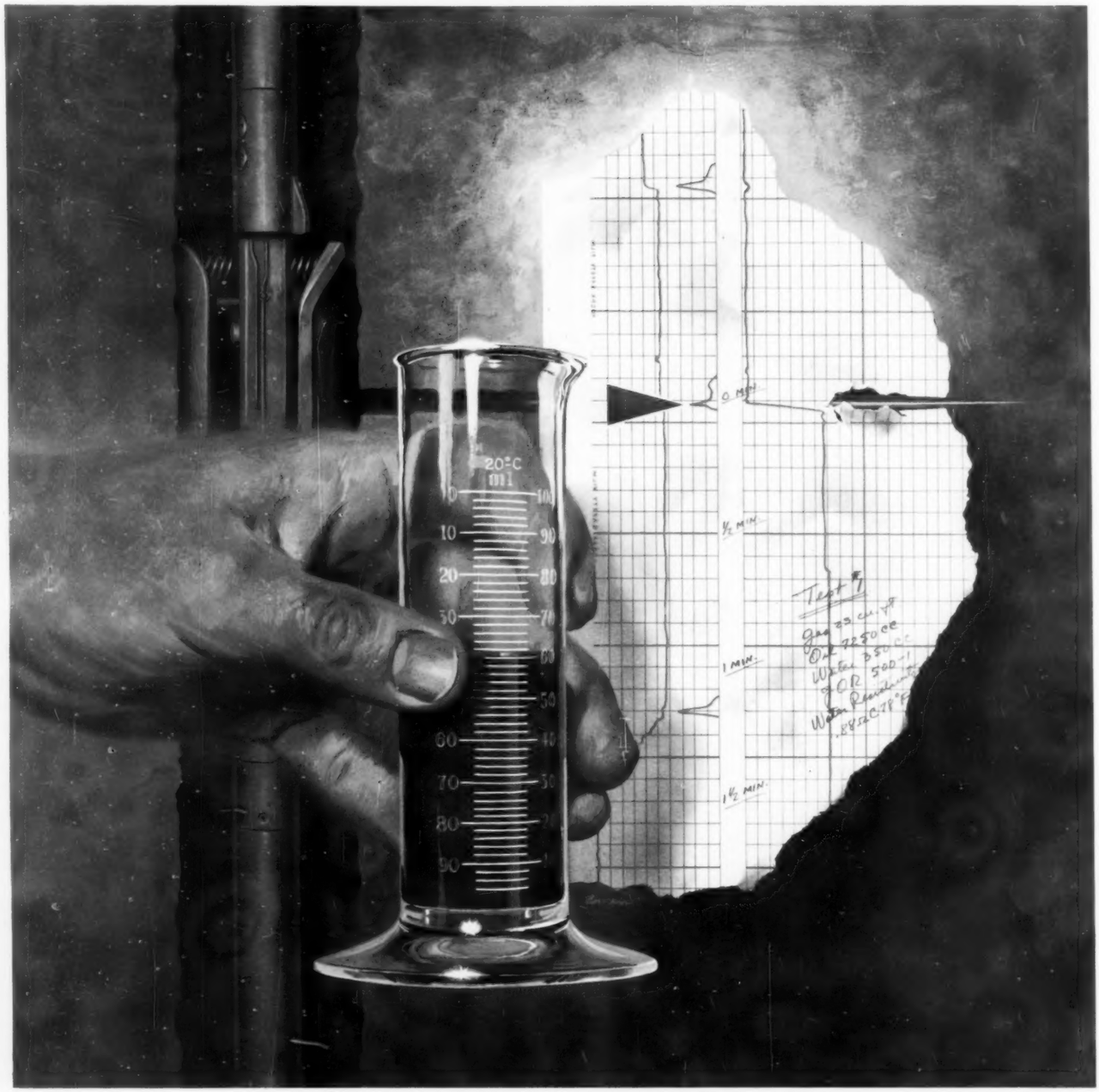
A job-rotation plan has been in effect in Mobil's drilling section for several years, with favorable results. Drilling personnel start off their employment as gang workers or helpers, and move successively through foreman, cat-headman, derrickman, to driller. Through this procedure, many Venezuelans have progressed to drilling supervisors, and even head tool pushers. The same is true in the transportation section, where this system has been in effect for more than 10 years.

Indoctrination of New Employees: The new Venezuelan employee's introduction to Mobil and to safety are simultaneous when he is placed on the payroll and turned over to his new supervisor. This indoctrination procedure usually consumes his first several days on the job. If the supervisor is skillful, a strong thread of respect for the business of preventing or avoiding accidents is thus woven early into the fabric of the new man's association with the company. By staying in the background during these formative days, the safety program seeks to leave the impression with the new man that safety is a part of his job requirement, and that it will be taught, evaluated, and enforced by his supervisor—not by a separate group with special authority or a cursory interest in what he personally is doing. This philosophy has its basis in the belief that accident prevention will necessarily rest on the shoulders of the supervisor anyway, since without his cooperation and active support very little progress can be expected in searching out and eliminating the complex factors which cause accidents. This axiom is especially a propos when viewed in the light of a supervisor who knows his future chances of promotion with the company will in a measure be dependent on the safety performance of his subordinates. The safety section itself gets into the act on the first Saturday morning following the new employee's day of hire. On that day, all new men hired the previous week report to the local safety office, where a classroom session is held with a member of the division safety staff in charge. These conferences cover such specific as how to use a hand fire extinguisher, etc. The idea is to cover subjects which would be difficult or inconvenient for the line supervisor. However, the group does receive a question-and-answer review of their previous instructions.

Supervisor Safety Meetings: To equip the line supervisor for the function of following up after the indoctrination, Mobil de Venezuela has monthly safety meetings for all supervisors below the level of section head. Every reasonable effort is made to create a receptive atmosphere. Comfortable chairs, good light, effective visual aids, even airconditioning (where possible), are enlisted to help get the message



SCHLUMBERGER NEWS



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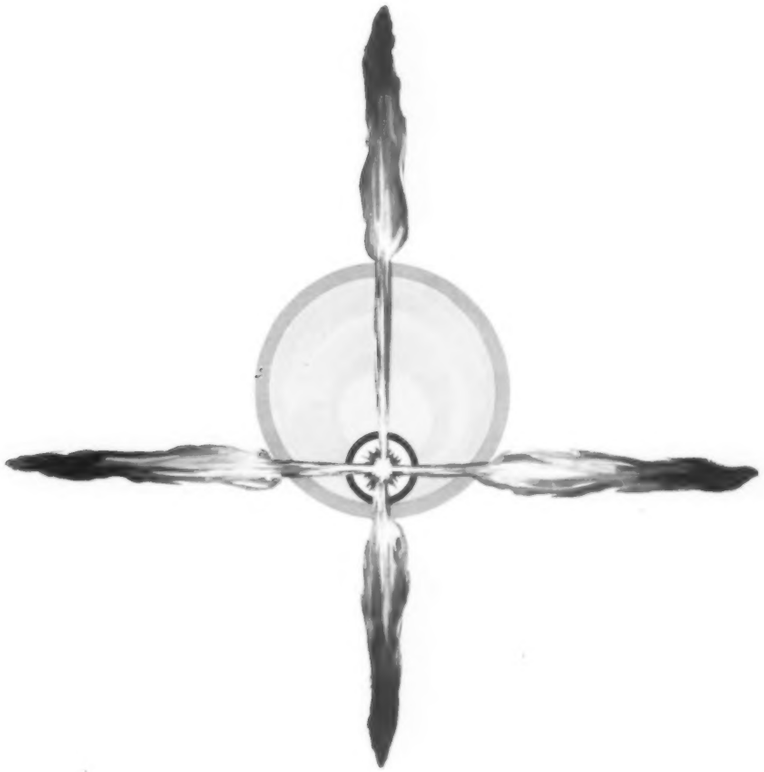
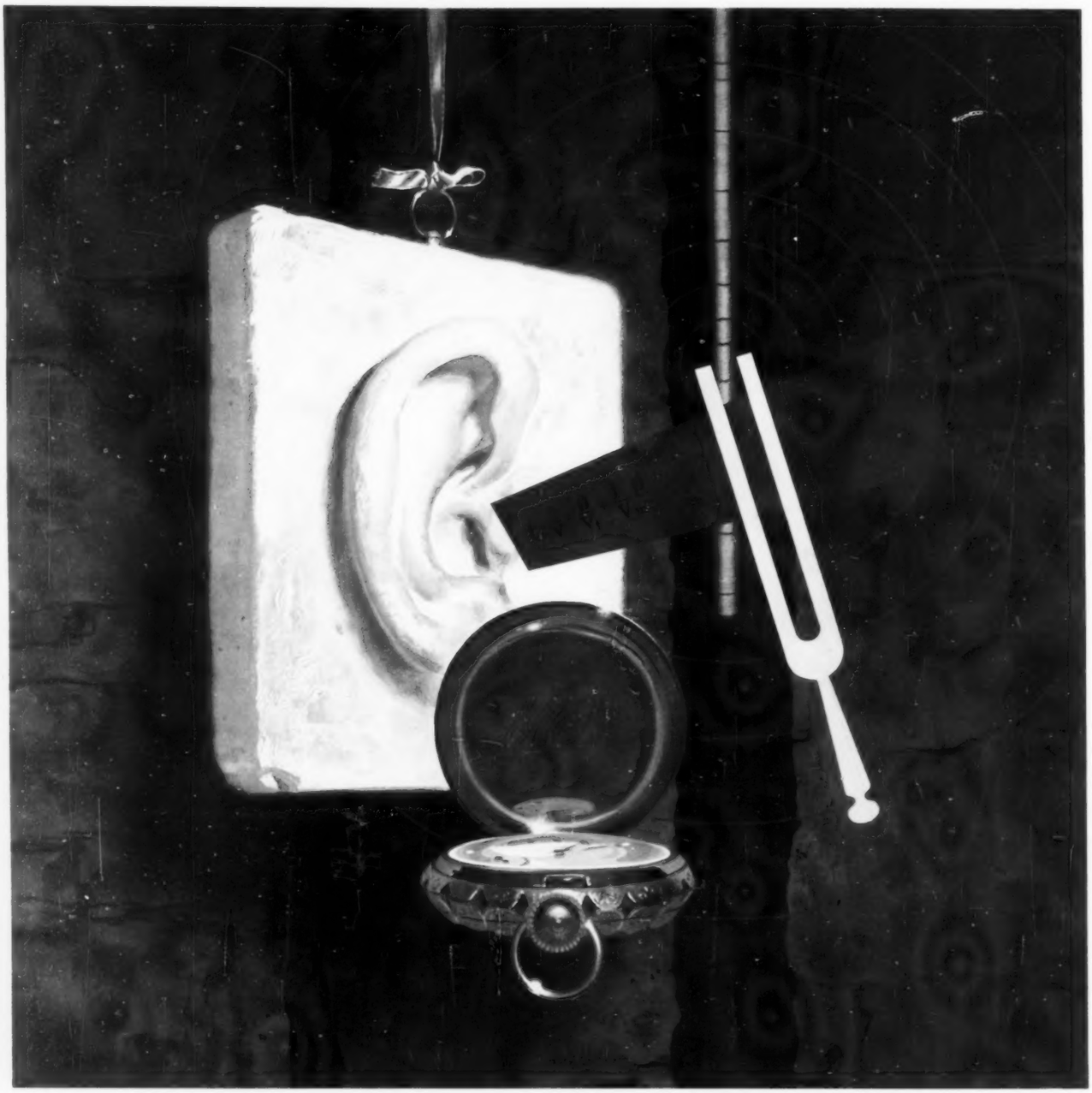
THE SCHLUMBERGER CAPSULE GUN



SCHLUMBERGER EXPENDABLE GUNS

SIZE	TYPE	PENETRATION IN BEREA TARGET WITH ½" CLEARANCE	HOLE SIZE IN CASING	PRESSURE RATING	TEMPERATURE RATING
2⅜ A-2 SUPERJET	TUBING GUN	7"	0.43"	8000 PSI	300° F
2⅛	CAPSULE	8"	0.45"	15000 PSI	300° F
1¾ SUPERJET	TUBING GUN	6"	0.31"	8000 PSI	300° F
1⅜	CAPSULE	6.25	0.30"	15000 PSI	300° F
NEW 1⅜ CHAIN JET	TUBING GUN	IN 5½" CASING 5.98 IN 7" CASING 5.8 CASING, ORIENTED GUN, JET ← → JET	0.241" 0.234"	6000 PSI	300° F



THE SONIC LOG

SOUND THAT THE EYE CAN SEE

For the Geologist and Engineer the new Schlumberger Sonic Log is a source of valuable well data. The Sonic Log provides:

- Excellent correlation from exacting detail due to its closely spaced detectors
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- Data for better interpretation of seismic diagrams
- Differentiation between water, oil, and gas in high porosity formations when combined with Resistivity Logs
- Clear indications of geological changes not apparent on other logs

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WHEREVER THE DRILL GOES – SCHLUMBERGER GOES • SCHLUMBERGER SURENCO, S. A.

across. The meeting is conducted in either English or Spanish, as indicated, by men specially trained in conference leading.

After his monthly exposure, the supervisor returns with renewed polish in what to say and how to say it best. It is always made clear that he, the line supervisor, is the man doing the talking or acting. Only rarely does the safety representative play anything but a background role.

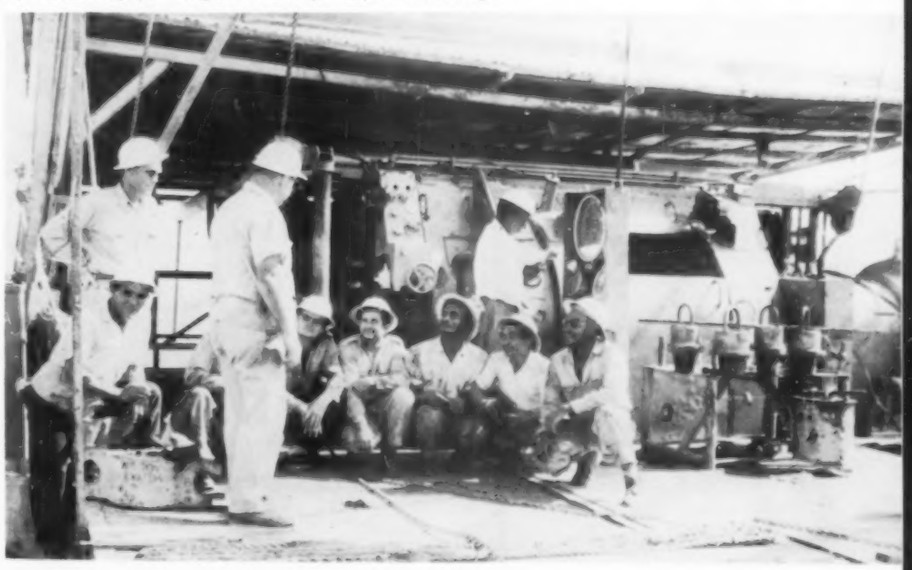
Inspection: Roving spot checks are carried out constantly by section heads as well as safety supervisors—with irregularities being corrected on the spot or referred to proper authority for correction. In addition, a vital check point is established by the company policy of requiring safety-section approval of "all additions or alterations to capital-investment properties or structures" before the work is started. Contracts with outside firms to do work for the company all carry a standard safety clause requiring the same standards of protection which are employed by the company itself. Certain operations, such as tank cleaning, welding on enclosed vessels, and similar unusual risks, have specific safety procedures which must be followed, and are closely watched by a safety representative while the work is in progress.

One of the more specific types of inspection is the quarterly supervisor's incentive plan. The various field sections are divided into groups, like teams, classified according to the inherent risk involved in their work, and handicaps are assigned to allow all groups to compete fairly. Each team starts with 500 points at the beginning of each calendar quarter. The scramble starts when an inspection committee (unannounced) visits each work location some time during the quarter, takes the supervisor in tow, and pokes into all dark corners, checks all work practices, all machines, and tries in general to ferret out every cause for safety concern which may exist. The people chosen on these committees are from jobs with sufficient authority so that most matters requiring correction can be taken care of on the spot, or at least without undue delay. Points are deducted for all departures from recommended practice, but bonus points can also be gained for anything outstanding such as improvement in accident frequency, or excellent housekeeping. Quarterly scores are added, and the group or team with the best total score at the end of the year wins. The prize need not be of great intrinsic value, but maintaining the proper spirit of competitive accomplishment is very important. Mobil gives a special gold lapel button to each supervisor in the winning group, and winning supervisors value them more than many other safety prizes of several times their value.

One of the fundamental tenets of the safety section is to seek ways to perform valuable service. It is along these lines and many others that Mobil de Venezuela seeks to continue to enlarge its contribution to the welfare and prosperity of an industry —and a nation. END

Shop skills are taught, equal to the best in USA manual-training schools, under Socony Mobil's Venezuelan training program.

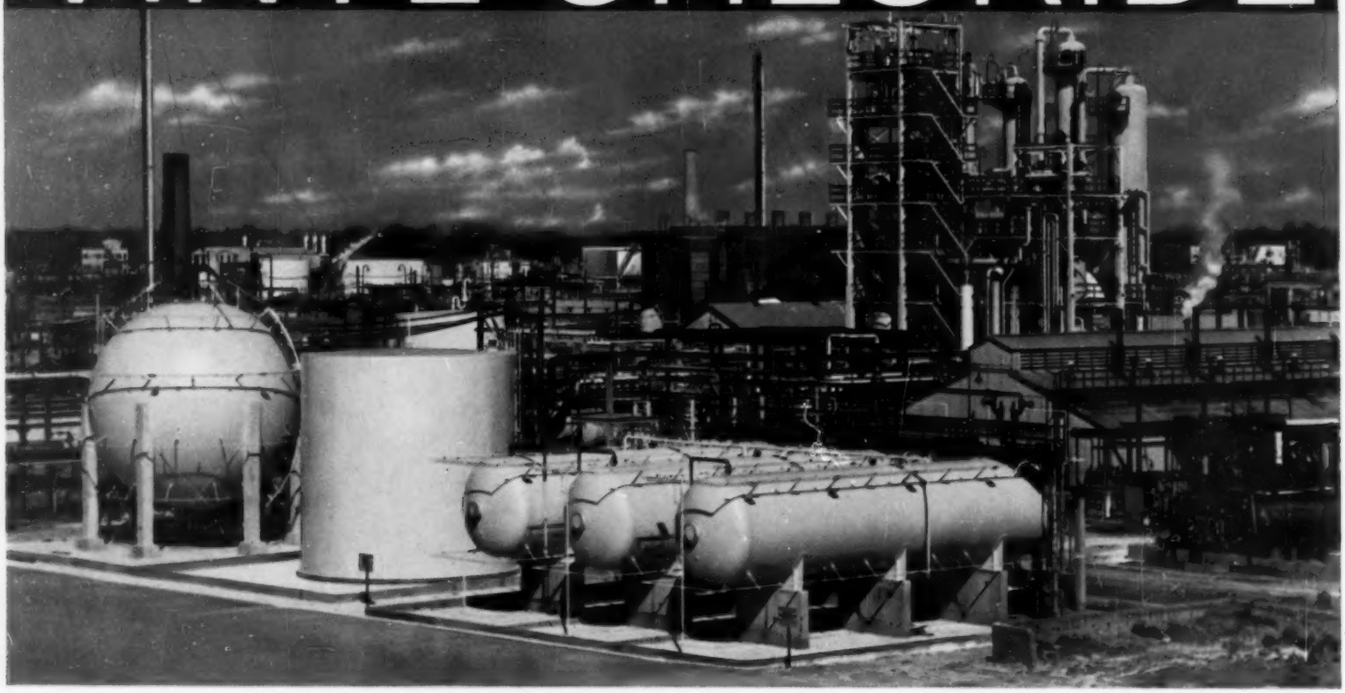
A five minute safety meeting is held once per shift on Mobil's rigs.



A working knowledge of Spanish can be obtained by Mobil employees in as few as 250 hours—using a tape recorder as the primary learning device.

Ethyl Corporation

VINYL CHLORIDE



plant engineered
and constructed by

CATALYTIC

Ethyl Corporation selected CATALYTIC for the engineering, procurement, and construction of its new Vinyl Chloride Plant. Close cooperation and coordination between Ethyl and CATALYTIC, utilizing to the fullest their joint experience with chlorinated hydrocarbons, resulted in successful on-stream operation of this plant within the scheduled completion time and budget.

CATALYTIC Construction Company

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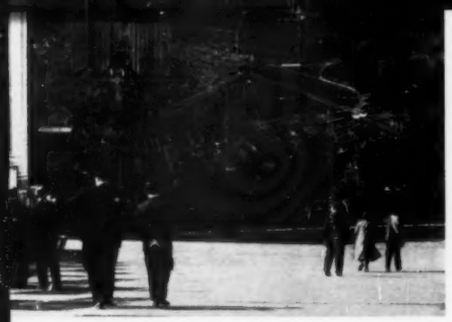
Baton Rouge, Louisiana
Toledo, Ohio
Tulsa, Oklahoma

In Canada: Catalytic Construction of Canada, Limited; Sarnia, Ontario; Toronto, Ontario; Montreal, Quebec

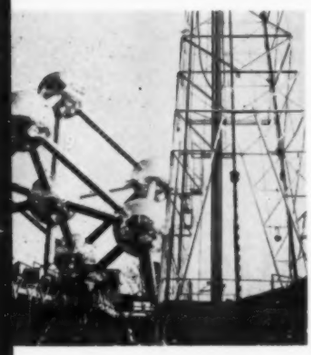
Catalytic *On-Time*... *On-Budget* Services
for the metallurgical, chemical, petrochemical and oil refining industries; Project Analysis; Process Development; Process Design; Economic Studies; Engineering; Procurement; Construction.



City of the Future—a drawing of the part petroleum will play in supplying energy.

A Hortonsphere for visitors—with a scale-model refinery inside.

Graphic illustration of the major role petroleum is to play in energy supply through 1975: The bottom section is petroleum.



Atomium, the fair's symbol: To the right is part of the petroleum exhibit.

Petroleum at the Brussels World's Fair

ONE of the outstanding public-relations gestures of the petroleum industry is the display it has assembled at the world's fair at Brussels, Belgium, which is being held April 17 through October 19 this year. Here, in the shadow of the Atomium (symbol of the dawning atomic age), the industry has erected a pavilion where all may see the vital role oil is playing in the world today, and how this role will continue for many years despite what many consider a threat from the atom. Also, the displays in the Petroleum Pavilion explain simply and impressively the role of exploration, the problems of production, the complexities of transportation, and the techniques of refining. It is a tribute to the planners of the oil industry's exhibit that, in a remarkably short time, the visitor can obtain an understanding not only of the basic operations of the industry, but also of the thousands of ways in which crude oil and its derivatives contribute to a better standard of living for all.

Visitors entering the fair by the Grand Palais entrance proceed toward the Portique de Belgique, above which rears the 320-foot-high Atomium. Passing through the arch, they are on the Avenue de Belgique and its water staircase. The Petroleum Pavilion is at the right on this avenue, just before one reaches the Atomium. Its graceful glass facade almost is overshadowed by the familiar skeleton of the full-scale oil derrick which has been erected in the patio of the pavilion.

As the visitor enters the Petroleum Pavilion, he is greeted by a multicolored pattern of spheres—reaching from floor to ceiling—which represent the products manufactured from crude oil. The all-pervading role played by oil in modern life and progress is inescapable. On the left-hand side of the foyer is a three-dimensional bar graph showing the sources of world energy, including atomic energy. Extrapolated to 1975, these statistics show that the increasing demands for energy will call for increased use of natural fuels—particularly petroleum. It is apparent atomic energy alone will be unable to meet the yearly increment in the world's demand for energy for some time to come.

In the first room, answers are given to the questions: what is oil? how was it formed? where is it found? Here the various tools and techniques used in the never-ending quest for oil in more than 100 countries are on display. The visitor is told, for example, how aerial photography is employed, and he may see for himself the value of stereoscopic photography. Exploration, the visitor learns, is a costly, exacting task which must be carried on in remote and inaccessible areas—in jungle and swamp, mountain and desert, and even beneath the sea. And, as he concludes his tour of the exploration section, he knows "only drilling can prove the presence of oil."

In logical sequence, the visitor moves to the section on production. Here a brief introduction takes one back more than a century in oil-industry history—to the days of Colonel Drake, percussion drilling, and the oil gusher. Then comes an explanation of the modern techniques of rotary drilling and of the new development, turbo-drilling. Made crystal clear to the visitor are the high risks of failure; and displays illustrate that, even if a "wildcat" strike is successful, it may take years to develop an oil field to commercial production. Visitors are also shown how the search for, and the production of, oil may bring new skills and occupations, new social and economic benefits, to previously underdeveloped countries—and how the wise use of oil revenues may transform the face of a country and the living standards of its people. On leaving the exploration and production exhibits, the visitor leaves the main building of the pavilion on the second floor and walks along a ramp to the section devoted to refining. In the central patio, he may view at close range the oil derrick, the beam pump, and the christmas tree—familiar sights in the oil field.

Between the main building and the Hortonsphere which houses the exhibit on refining are displays depicting the oil industry's transportation facilities. The visitor learns about the advantages and disadvantages of pipelines, sees how they are constructed, and how much they cost. The development of the supertanker is shown, as well as the importance of tankers to the world's merchant fleets. Still following the flow of oil, visitors move toward the real-life destination of oil—the refinery. On entering the Hortonsphere, one's first impression is of tall columns and strange shapes. It soon becomes apparent these are symbols of the complex of plants and installations which make up a modern refinery. The scale model of a refinery takes up almost the entire diameter of the sphere. The displays follow an ascending path around the interior of the sphere.

These explain the techniques of refining, the principal refining processes, as well as the products of refining and major uses. Research—indispensable to an industry as competitive as oil—is illustrated by research applications to each of the major product groups covered in the displays.

The last stage of the refining section deals with petroleum chemicals, and on display is the amazing range of chemicals based on oil. Plastic spheres suspended from the dome of the sphere contain examples of everyday articles made from petroleum chemicals.

From the sphere, the visitor passes along displays which illustrate the distribution of oil products in a sequence from bulk supplies to the small quantities used by the domestic consumer. Ahead of him is a vast mural summarizing visually the whole flow of oil from oil field to consumer. A dramatic presentation of the place of oil in the world's energy picture today and tomorrow, this mural leaves all who view it with an inescapable awareness of the world's rising dependence on oil. END

At left of photo is the new pier under construction at the docking facilities of Creole's Amuay Bay refinery.

Major refinery increases in Venezuela

One completely new 40,000 b/d refinery building, large additions in three major plants—that is the pace of Venezuela's refining industry.

THREE of the existing refiners in Venezuela—Creole, Shell, and Richmond—plan substantial increases in their capacities this year. Added to these will be the first new refinery built in Venezuela for many years, the new Socony Mobil de Venezuela plant at Puerto Cabello. In addition, two new lube plants—one already completed in May of 1958 by Creole and, one to be built with the new Socony plant—will start to go onstream. All these plans add up to a record construction year in 1958, and an even higher year in 1959.

Socony Mobil Oil Co. Inc. has announced its Venezuelan affiliate will build a wholly-owned $28 million refinery at El Palito, about eight miles west of Puerto Cabello. Construction is scheduled to begin early this year; to be completed late in 1959.

The refinery will be at the terminus of the Barinas El Palito crude-oil pipeline, which was completed last November.

Rated initial capacity of the refinery will be 40,000 b/d, with appropriate provisions for future expansion. Its crude oil will come initially from the Silvestre field, near Barinas, which Socony Mobil discovered in 1947; but the plant will be able to process other crude oils available in the area. Part of the lighter products will be marketed in Venezuela, while the remainder will go to world markets. Present plans do not envisage shipments of products from this refinery to the United States for internal consumption.

Processing equipment will include a crude-oil distillation unit, with complete stabilization facilities, a platinum-catalyst reformer for producing high-octane gasolines, and equipment for blending and treating gasolines.

Creole Petroleum Corp.: The Amuay Bay refinery of Creole Petroleum Corp. has increased its crude refining capacity by 104,000 b/d by installation of a fourth atmospheric pipe still, which went onstream in September 1957. This brought the total design crude distillation capacity at Amuay to 328,000 b/d; and this, added to the 60,000 b/d capacity of the Caripito refinery, brought Creole's total crude refining capacity close to 400,000 b/d. The new pipe-still equipment includes a furnace, atmospheric fractionating tower with attendant facilities for preheating the crude and cooling and handling the products, and treating facilities. The new pipe still processes Bachaquero crude in a topping operation to produce a bottoms of 93.5%. A naphtha product is taken overhead, and no sidestream products are produced; however, the tower is designed so that future sidestream facilities can be added when desired.

Operation of a 17,000 b/d diesel-oil hydrofiner was begun in January 1958. This unit can desulfurize Tía Juana medium diesel oil down to 1.0% from 2.0% by weight of sulfur. The reactor is of the fixed-bed type, employing cobalt-molybdate catalyst. A gas-oil feed stock is charged to the reactor with a hydrogen-rich tail gas from the hydroformer to obtain the desired sulfur reduction. In addition to the reactor, the equipment consists of guard drums employing zinc-oxide and nickel catalysts for the removal of sulfur and carbon monoxide from the treat gas, preheat furnace, diesel-oil stripper, and associated heat exchangers, pumps, and auxiliary equipment. Steam and air regeneration facilities enable periodic regeneration of the reactor catalyst.

A fourth finger pier was put into operation at Amuay in February 1958. The new pier, which replaced a shallow-berth wooden pier, is 1,105 ft long and supported by concrete piles. The harbor was dredged to a depth of 41 ft, and hose-handling and loading facilities were modernized on all piers.

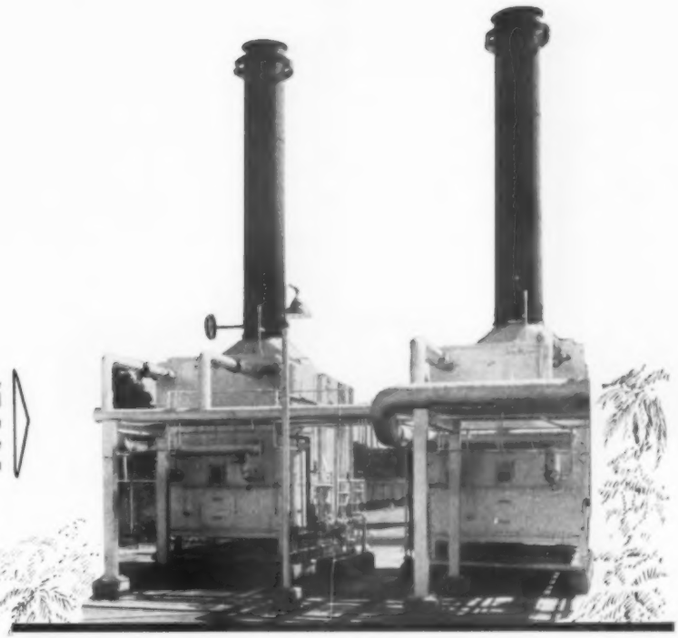
At this writing, a 700 b/d lube plant was scheduled to go onstream in May 1958. Tía Juana medium distillates will be phenol-treated, hydrofined, and propane-dewaxed, and subsequently blended with purchased bright stock and additives to produce a full range of motor-oil and industrial-lubricant products. Packaging facilities will enable marketing the products in quart cans, 5-gal pails, 16-gal drums, and 55-gal drums. Equipment will also be provided for shipment of lubes in bulk. Hydrogen-rich tail gas from the hydroformer will be supplied to the hydrofiner, which will improve the color and color stability and reduce the Conradson carbon content of the lube base stocks. Phenol treater will enable production of high-viscosity-index products.

To meet the increased requirements of electrical and steam generating capacity, two 7,500-kw gas-turbine generators and two 50,000-lb-per-hour 150 psi pressure waste-heat boilers are scheduled to start operating in July 1958. These two new generators—together with the present three 7,500-kw steam generators—will provide a total electrical power generation of 37,500 kw.

To handle the requirements of the expanded Amuay refinery, substantial additions are also being made to the shop, warehouse, and laboratory facilities.

(Continued on page 82)

Born prefabricated, preassembled heaters in a natural gasoline plant in Venezuela



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Many of the Born Heaters shipped to Venezuela and other South American countries are their famous prefabricated, preassembled heaters which arrive at the destination completely assembled, skid-mounted and ready for hook-up. These heaters are available for almost any service, in sizes ranging from 500,000 to more than 30,000,000 BTU per hour absorption duty.

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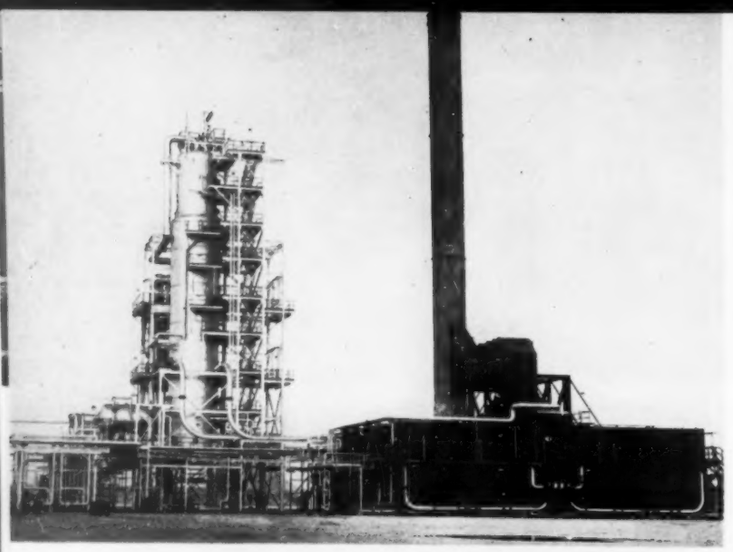
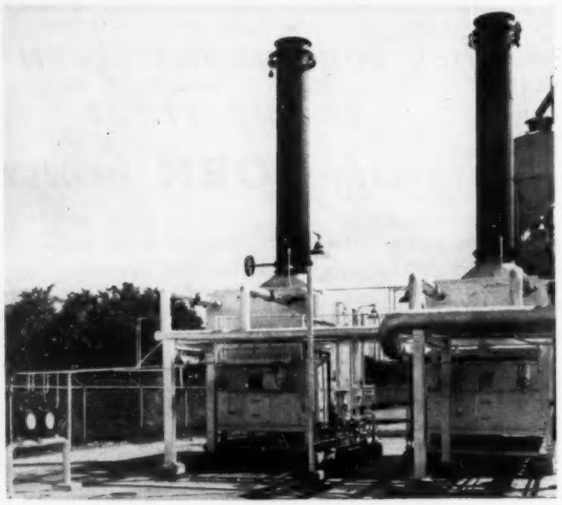


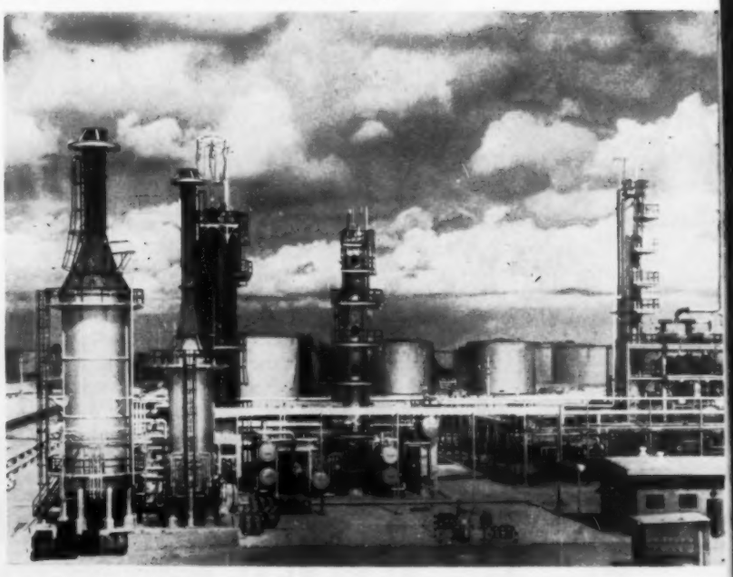
No. 4 pipe still at Creole Petroleum Corp.'s Amuay Bay refinery raised capacity by 104,000 b/d—bringing the refinery's capacity to 328,000 b/d.

Richmond Exploration Co.'s Bajo Grande asphalt refinery: Capacity at primary distillation unit No. 1 is 10,000 b/d; at unit No. 2 two-stage asphalt plant, 10,000 b/d; and at unit No. 3 single-stage distillation plant, 15,000 b/d.



Two Born prefabricated heaters in a Venezuelan natural-gasoline plant.

Diesel-oil Hydrofiner at Creole's Amuay Bay refinery.



Panorama of Richmond Exploration Co.'s refinery, tank farm, and deep-water terminal on the west shore of Lake Maracaibo: The two earthen fuel-oil reservoirs in the foreground have a total capacity of 5½ million barrels.

At the Caripito refinery, facilities will be expanded to enable terminalling and transshipping of 40,000 b/d of additional crude to be delivered to Caripito via a new 92-mile 30-in. pipeline from the Temblador area.

Cia. Shell de Venezuela: The first refinery in Venezuela was built by a Shell company at San Lorenzo, situated on the east coast of Lake Maracaibo. Today, after many extensions, San Lorenzo has a rated capacity of 45,000 b/d, and it produces a wide range of straight-run products.

San Lorenzo has been far superseded by the giant refinery at Punta Cardón, a deep-water terminal protected from the strong northwesterly winds on the Paraguana peninsula, Estado Falcón. Construction of Cardón refinery on the barren site commenced in 1945, and its development has been continuous since that date. Today Cardón is an integrated refinery of 203,000 b/d crude-oil rated capacity, and includes extensions—which were officially inaugurated in November 1957—consisting of a 35,000 b/d catalytic cracking complex and a 2,500 b/d hydrofluoric-acid alkylation unit. In addition, an 80,000 b/d atmospheric distillation unit is in the final stages of construction and, when completed, will bring the capacity of the refinery to 283,000 b/d. These latest additions have brought Cia. Shell de Venezuela's total investment at Cardón to over $300 million, and have made Cardón the most complete refinery in South America—among the largest and most modern in the world.

The facilities at Cardón include two two-stage and one atmospheric crude-distillation units; two Dubbs thermal cracking units with combined capacity of 28,000 b/d; an 8,700 b/d thermal reforming unit; a polymerization unit; and a 3,000 b/d lubricating-oil complex. The luboil complex is the only one in Venezuela to manufacture a full range of high-viscosity-index lubricating oils, and comprises propane deasphalting, furfural extraction, solvent dewaxing, and clay-contacting units. A blending and drum and can-filling installation completes the luboil complex.

In 1957, a 20-in.-diameter 178-mile natural-gas line from the La Paz field in the Maracaibo district was constructed and taken into operation. The $21 million line has a capacity of 100 million cubic feet of gas per day, the gas being burned as fuel in the refinery furnaces—thus releasing 400,000 tons of fuel oil for export annually.

To satisfy the growing demand for high-octane motor gasolines and to produce essential high-octane components for aviation gasoline, a catalytic cracking complex and an alkylation unit (using hydrofluoric acid as catalyst) were constructed, and have been put into service.

Feed stock for the cat cracker is derived from two new high-vacuum units operating in parallel—the joint feed to these units being 60,000 b/d. The main vacuum towers have a diameter of 24 ft 6 in., and are lined with special alloy steel to resist corrosive operating conditions. A cyclone separator, located in the flash zone of the main column, aids the separation of distillates from short residue. The forced-draft furnaces are equipped with Ljungström air preheaters, and firing is completely automatic.

Heavy distillates from the high-vacuum feed-preparation units are fed directly to the fluid cat cracker unit. The cat cracker is a heat-balanced unit of Shell design—with separate reactor, regenerator, and stripper vessels; and has a capacity of 35,000 b/d of fresh feed. The heavy residue and cat-cracked cycle oil withdrawn from the fractionating tower are in-line blended to fuel oil, whilst the gasoline and lighter fractions are processed in a light-products separation unit to yield debutanized gasoline, butane-butylene, propane-propylene, and refinery fuel gas. The high-octane (98 research octane number) gasoline is caustic-soda-washed, and treated in a solutizer unit before final storage.

The sensible heat and heat of combustion of the flue gas leaving the catalyst regenerator are used in a special boiler for steam generating. The steam-raising capacity is 130 tons per hour. A small amount of fuel gas is burned simultaneously to maintain a sufficiently high temperature for the combustion of the carbon monoxide contained in the regenerator outlet. The stack of the "CO boiler" is constructed of concrete—the height of the latter being 330 ft to insure adequate dispersal of the flue gases.

The butane-butylene stream, ex the light-products separation unit, is treated with caustic-soda solution to remove any detrimental sulfur compounds, and then dried in a drying tower before being fed to the 2,500 b/d alkylation unit. The desired ratio of isobutane to butylenes in the net feed stock to the HF alkylation unit can be balanced by: (a) processing part of the butane-butylenes in the polymerization unit where the butylenes are polymerized; or (b) by adding outside isobutane; or (c) a combination of the two.

The dried, balanced butane-butylene feed stock is charged, together with the isobutane recycle stream, to the water-cooled Stratco contactors. In the contactors, the feed mixture is brought into intimate contact with the hydrofluoric-acid catalyst, and the alkylation reaction takes place. The contactor effluent—consisting of hydrofluoric acid and hydrocarbons—is separated in the primary settlers located above the Stratco contactors. The acid layer flows back into the contactor, whilst the hydrocarbon layer is subjected to azeotropic distillation in the acid stripper, deisobutanization, and final removal of alkylfluorides by contacting with bauxite. The defluorinated reactor product is further separated into normal butane, aviation alkylate, and heavy alkylate bottoms. The aviation alkylate is of very high quality, with a rich rating performance number of 147/148, and is used for preparing the highest grades of aviation gasoline.

The increases in processing capacity at Cardón refinery have naturally necessitated

(Continued on page 120)

1958 VENEZUELAN REFINING CAPACITY

Plant	Location	Crude Capacity	Type Plant	Cracking Capacity
Creole Petroleum Corp.	Amuay Bay[1]	328,000	S	———
	Caripito	60,000	SC	35,000T
Phillips Oil Co.	San Roque[5]	3,000	S	———
Richmond Exploration Co.	Bajo Grande[4]	45,000	SA	———
Cia. Shell de Venezuela Ltd.	San Lorenzo	45,000	S	———
	Cardon[2]	203,000	SCI	63,000TC
Shell: Colon Development Co. Ltd.	Casigua	1,000	S	———
	La Rivera	300	S	———
	El Calvario	300	S	———
	El Cubo	570	S	———
Sinclair Oil & Refining Co.	Puerto La Cruz	35,000	S	———
Socony Mobil de Venezuela	Silvestre	200	S	———
	El Palito[7]			
Texas Petroleum Co.	Tucupita	10,000	S	———
Venezuelan Government	Moron[6]	3,000	Comp.	1,800T
Venezuela Gulf Refining Co.	Puerto La Cruz[3]	57,000	Comp.	18,660TC
		791,370		118,460

[1] 11,000 b/d Hydroforming capacity; 700 b/d lube plant went into operation May 1958. 17,000 b/d Hydrofiner onstream January 1958.

[2] Includes new 35,000 b/d catalytic cracking capacity recently added. 25,000 thermal cracking capacity, 2,800 b/d alkylation plant. 80,000 b/d distillation unit under construction, to be completed 3rd quarter 1958.

[3] Includes 14,500 b/d vis-breaker unit. Also has polyform unit. Fluid catalytic cracking unit is 8,660 b/d capacity; thermal cracking unit 10,000 b/d.

[4] Consists of three distillation units: Unit 1 has 15,000 b/d capacity; unit 2 has 10,000 b/d capacity; unit 3 has 20,000 b/d capacity. Unit 2 to be expanded to 15,000 b/d by addition of heat exchangers and feed pumps. No. 3 to be raised to 23,000 b/d for production of topped crude and heavy fuel oils and 8,500 b/d asphalt. All additions to be completed during 1959.

[5] Consists of two separate plants at same location: including one 500 metric tons per month lube plant; one 3,000 b/d refinery which makes about 1,200 b/d of motor gasoline, also kerosine and diesel fuel. Gas-stabilization unit is connected.

[6] A pilot plant with complete facilities for experimentation. A larger refinery and a petrochemical complex have been under construction, but plans are presently being restudied.

[7] 40,000 b/d plant to be constructed at El Palito terminus, about 8 miles from Puerto Cabello. Lube plant to be included. Facilities for production of high-octane gasoline to be included.

Capacities in barrels per day. Key to type of plant: S—Skimming; L—Lubricating; A—Asphalt; C—Cracking; Comp.—Complete. Under cracking capacity to indicate type: T—Thermal; C—Catalytic.

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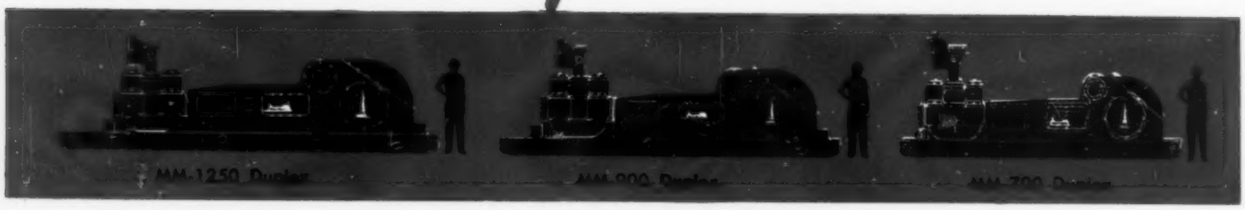
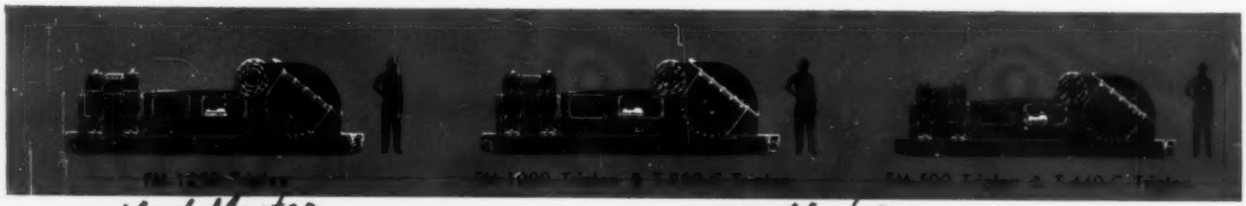
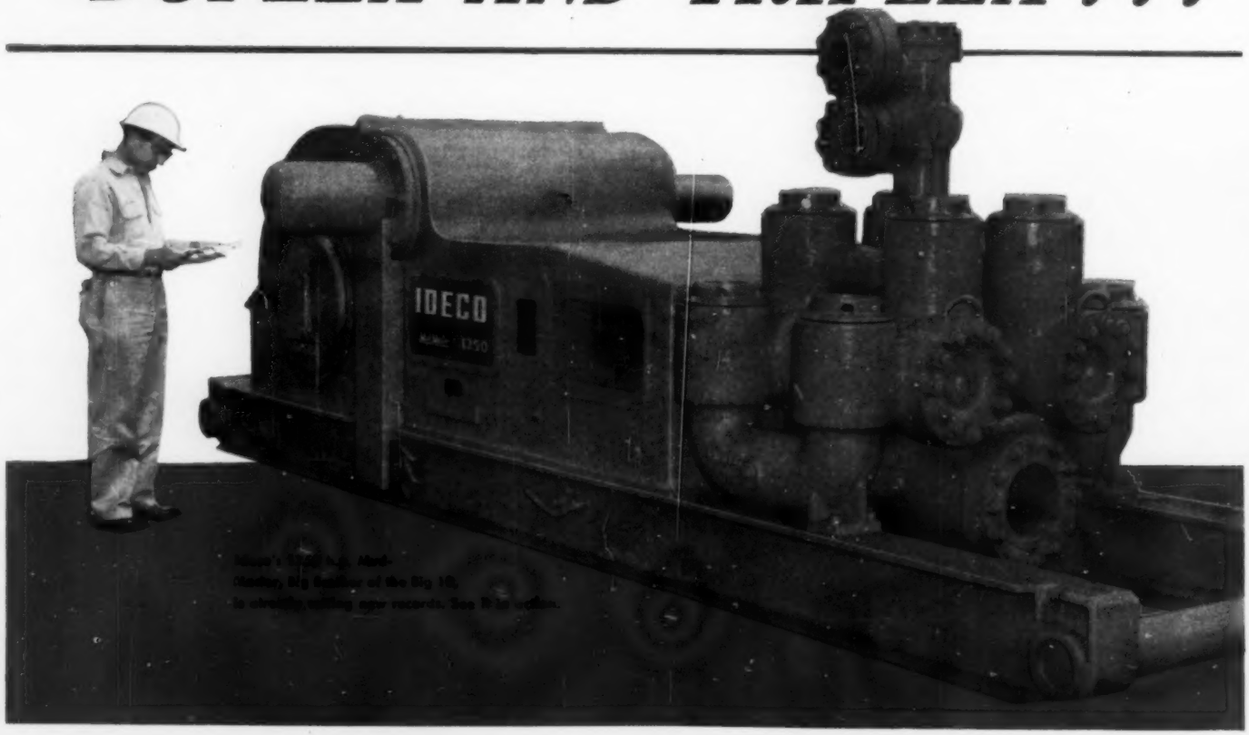


MODERN AS TOMORROW...



Mud-Master Flo-Master

DUPLEX AND TRIPLEX...



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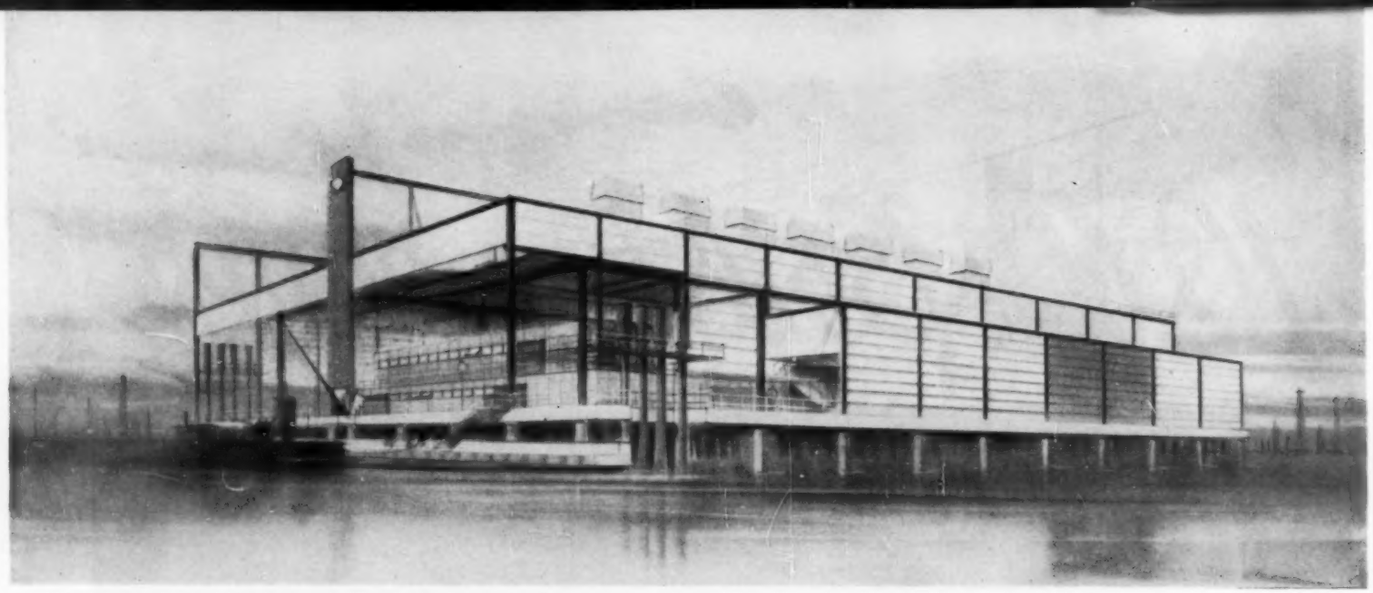


Artist's sketch of Cia. Shell's Lake conservation plant.

Shell's new gas-conservation plant

A major gas-conservation plant is being built by Cia. Shell in Lake Maracaibo, designed both for conservation and industrial gas supply.

CIA. SHELL DE VENEZUELA LTD. is working on plans aimed at putting into operation a major gas-conservation plant some 19 miles offshore as shown in Fig. 1, in Block I of Shell's Lake of Maracaibo concessions. The plant would supply gas for reinjection into a reservoir, denominated Marrón in CSV. Block I, for gas-lifting of lake wells and for industrial use ashore. The total cost of the project, including gas-collection and distribution systems, is estimated at $26 million. It offers a number of different features from the reservoir standpoint and from the design of the plant.

The Marrón reservoir is one of the C-Group reservoirs of Eocene age in Block I in which oil was discovered in 1952. Wide outstepping in 1953 and 1954 confirmed the major size of the accumulation. General development of the reservoir began in 1955.

Structurally, the Marrón reservoir is located in a central horst in Block I, bounded to west and east by major faults which are separated by 2 to 3½ miles—the total productive area being about 10,000 acres. The Eocene formations have an areal dip of about 5° in an easterly direction—oil being trapped against the boundary fault to the west and against an unconformity between the Eocene and younger Tertiary formations. The producing interval of the Marrón reservoir occurs at depths of 5,000 ft to 6,000 ft below lake level, and consists of alternating sandy and shaly sections of variable lithology. Total interval thickness is about 400 ft, and sandiness varies considerably over the section—with an average of slightly less than 30%. There is also considerable lateral variation in sand development. The productive area is divided into several fault blocks by cross-faults.

Development drilling has been on 77-acre spacing, with 38 completions to date. Gravity of produced oil is in the range 27 to 34 API, and solution gas-oil ratios vary from 430 to 850 cu ft per bbl. Initial reservoir pressure was 3,200 psig at a datum of 6,500 ft below lake level. Sand permeabilities are in the range of 150 to 1,000 millidarcies, and well productivity indices are in the order of 3 bbl per day per psi drawdown. Reservoir oil properties vary considerably with depth—original oil undersaturation varying from 100 to 400 psi. Current offtake from the total reservoir is about 50,000 bbl per day, and by the end of 1957 almost 33 million barrels of tank oil has been produced. The reservoir was produced by depletion.

It was evident the reservoir was unsuitable for recovery stimulation by water injection in view of the highly variable sand development; but, by 1956, the data indicated a considerable part of the reservoir might be used for pressure maintenance by gas injection. Possible benefits would be gas conservation and, less certainly, an increase in ultimate oil recovery and acceleration of recovery. Considerable difficulty is anticipated with gas bypassing in these sands as distinct from existing gas-reinjection projects in western Venezuela, where much simpler and uniform reservoir conditions prevail. A multiple radioactive tracer program is, therefore, planned to assist in studies of gas migration.

The project is being designed to collect approximately 190 million cubic feet daily (mmscfd) of low-pressure lake gas which will be gathered from a dozen block stations where gas is separated from the crude oil at a pressure of 60 psig. This gas would be fed through a submarine pipeline system, as shown in Fig. 2, to the compressor plant where gas-turbine-driven centrifugal compressors would progressively raise the pressure in seven stages.

It is envisaged that the plant would have three functions, with the following approximate quantities and pressures: (a) supply of 100 mmscfd of gas at a pressure of 2,500 psig for reinjection; (b) supply of 35 mmscfd of gas at a pressure of 2,500 psig for gas lift; (c) supply of 35 mmscfd of gas at a pressure of 600 psig for industrial purposes.

The balance of 20 mmscfd of gas would be used as fuel and condensed to liquids. Each compressor will receive its gas through a vertical separator, where entrained liquid is separated from the gas. The temperature of the gas after each stage of compression will be reduced by means of fin-fan coolers. The use of air as a coolant rather than water—although

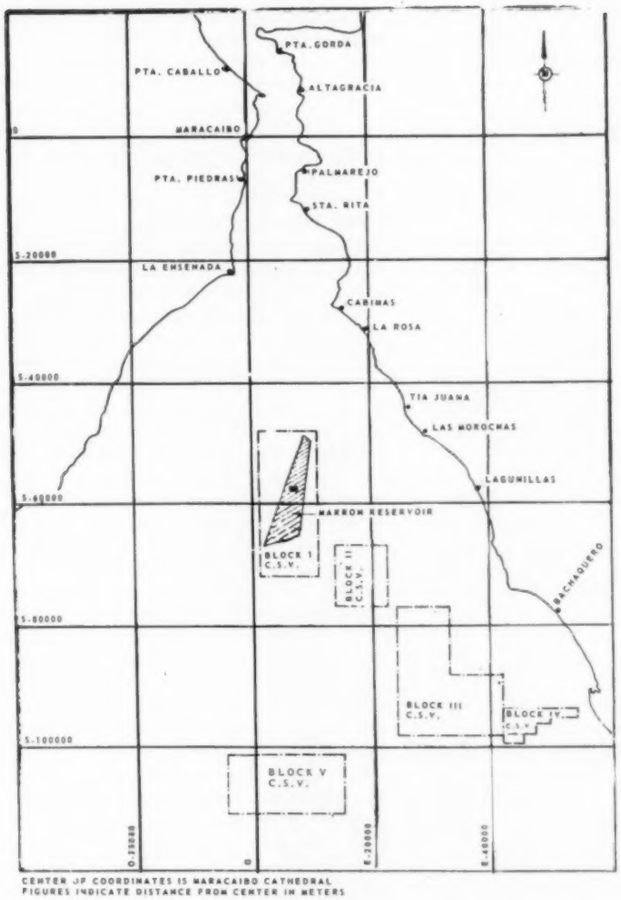


Fig. 1. Shell's new offshore gas-conservation plant in Lake Maracaibo.

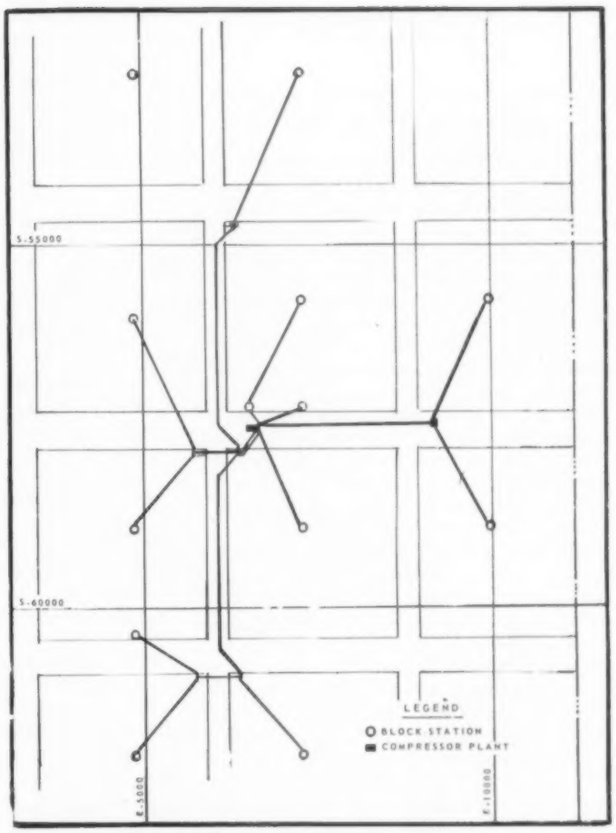


Fig. 2. Submarine pipeline system and compressors for raising pressure of low-pressure gas.

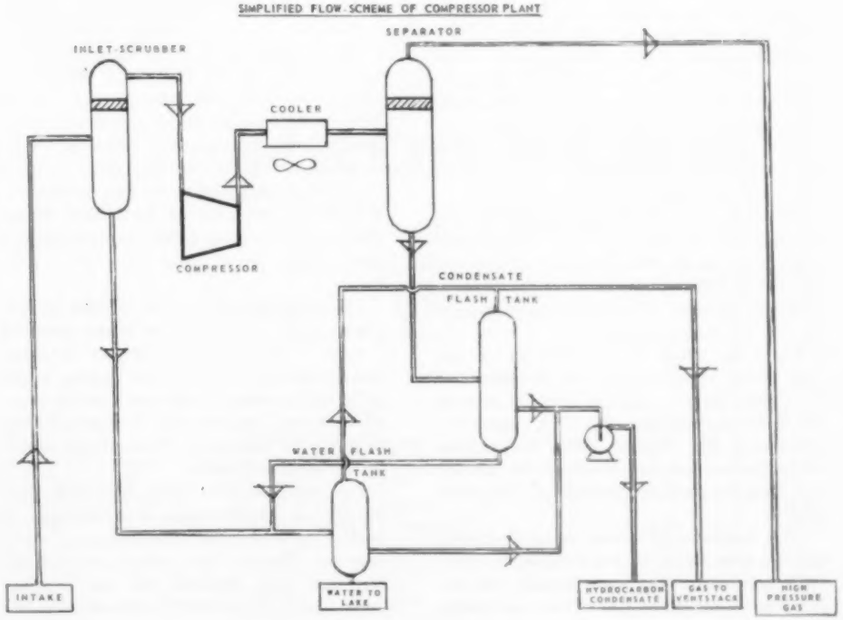
the latter is available in abundance—is justified by the fact that lake water is very corrosive and by platform space-economy considerations, since fin-fan coolers can easily be built high up in the air, as for example, ontop of the roof. A simplified flow scheme of the process is shown in Fig. 3.

The gas pressure would be varied from 30 to 2,500 psig, in seven stages of compression, with seven centrifugal compressors individually driven by simple-cycle double-shaft gas turbines with a total nema rating of 63,900 hp. Clark Bros. is manufacturing the turbines and compressors.

The plant would be built on a concrete platform, about 14½ ft above water level. Depth of the lake in this area is approximately 80 ft. About 35,000 square feet of platform area would be required. The turbine hall, work shops, warehouse, switch rooms, control room, offices, and messing facilities would be enclosed by a building with a steel frame and a flat concrete roof, and the sides closed with louvers. Special attention is being paid in the design of the building to the attenuation of noise produced by the gas turbines. END

Fig. 3

SIMPLIFIED FLOW-SCHEME OF COMPRESSOR PLANT



Oil Restrictions

(Continued from page 45)

schedules covering importers' programs through November were the last to be issued before the July restriction program commenced. By subtracting what was subsequently reported as actual imports from Venezuela from the importers' plans, we arrive at an average loss to Venezuelan outlet of 154,000 b/d in the months of September, October, and November. (July and August imports were not fully adjusted to the import restriction program.)

This loss applies only to Districts I-IV imports from Venezuela during the months specified, and is an average for the period. In monetary terms, with an estimated government revenue of $0.81 per barrel, the loss to the government was at an annual rate of $45.5 million. The loss to the Venezuelan oil industry in sales revenue was an estimated $145.6 million on an annual basis. With a similar analysis, the loss due to the District V import restrictions imposed in December is estimated at 14,500 b/d, or $4.1 million annually in government revenue and $13.2 million annually in oil-company sales revenue.

The Districts I-IV allowables were reduced in March 1958. The effect on Venezuela happened to be less than on other exporting regions, mainly because a number of new importing companies were admitted to the program and most of these newcomers planned to import from Venezuela. The net effect is estimated at a loss, up to September 1958, of an average 24,000 b/d, corresponding to $6.8 million annually in government income and $21.8 million annually in the industry's sales.

Since the programs came at different times, and we have no way of knowing what District I-IV imports would have been after November on a nonrestricted basis, we must resort to some artificiality in estimating the overall effect of the three programs. All we can say is that, if the programs had all occurred at the same time, a loss to Venezuelan outlet of some 192,500 b/d would have been experienced, representing a reduction of $56 million annually in Venezuelan government revenue and $181 million annually in Venezuelan oil-company sales.

These are not small losses; 192,500 b/d corresponds to over 17% of Venezuela's crude exports in 1956. The annual government loss, $56 million, is about 6% of government revenue in a normal year, exclusive of concession payments.

The Venezuelan oil industry and economy have actually suffered greater loss than these figures indicate, and for reasons not directly connected with USA import restrictions. By March 1958, Venezuelan crude production had declined by 476,500 b/d from its peak of 2,969,000 b/d in June 1957.

USA import restrictions were obviously not the only cause of the decline. In June 1957, production was high because the reopening of the Suez Canal had not taken full effect in easing demand for Western Hemisphere crude. In the fall of 1957 economic activity in the United States fell off, and the weather was warmer than normally. The separate influences on Venezuelan crude production are tentatively estimated as follows:

	Barrels Per Day
Decline due to elimination of Suez crisis	134,000
Decline due to USA import restrictions	168,500
Decline due to USA economic recession and warm weather	174,000
Total decline in production	476,500

Thus, 35% of the fall in Venezuelan crude production can be attributed to USA crude-oil import restrictions.

So much for the impact of USA oil restrictions on Venezuela, so far as we are able to estimate it. It is not inconsiderable, but the Venezuelan economic position is still very strong—particularly in financial reserves—and is not going to collapse merely because of the restrictions as they are at present. The real concern is that USA oil import restrictions should quantitatively not overstep the limit of reasonableness; even more, that they should not become mandatory restrictions incorporated in the law of the United States. They are designed to deal with a temporary situation, even though by "temporary" is meant several years.

The "national security" basis for restricting USA oil imports has been debated *ad nauseam* ever since the problem first arose, and the military justification for protection of the domestic oil industry against imports has never been satisfactorily established. Those who have argued the "insecurity" of foreign oil in general have been faced with the absurdity of comparing the relative security of Texas and Venezuelan tanker-borne oil of Mid-Continent and Albertan oil.

The problem is not the military availability of foreign oil (in World War II the Caribbean area was just as well, if not better, placed than the continental United States in furnishing petroleum supplies for allied use); it is rather the importance of maintaining a progressive and prosperous domestic oil industry in the United States. This is a defensible policy in terms of national security—at least on a short-term basis.

The domestic oil industry is such an important sector of the United States economy —even more, of the economies of many states—that to let it fall into neglect would be to invite serious weaknesses in the overall economy, because the theoretical ideal of optimum allocation of resources cannot be achieved overnight.

The share of USA domestic crude production in world supply will continue to decline because of the distribution of world reserves. There is no getting around the fact that USA demand will run increasingly ahead of domestic production in the long run. The latter is expected to reach a peak of about 10 million b/d within a decade or two, and a rapidly increasing volume of petroleum imports will be needed.

The present situation of world oversupply is a passing phenomenon, and it would be the worst kind of mistake to legislate permanent restrictions as if it were going to be permanent. Once provisions which favor particular groups are incorporated into legislation, it is very difficult, as experience shows, to remove them even when the original conditions have long since changed.

Within a relatively short time, USA national security may be measured in terms of the oil-producing potential of friendly countries. It would be dangerous for the future to place long-term encumbrances on their ability to develop their oil-producing potential. The USA administration and much of the USA oil industry have been opposed to the idea of mandatory restrictions—either because of the considerations referred to above, or because it is realized that compulsory federal controls over part of the industry's operations should be avoided where possible, since they open the door to extensive regulation of the whole. Compliance with the voluntary programs is now practically complete, and mandatory controls would be unnecessary and also a deviation from the principle of free enterprise in the oil industry.

There are other considerations in national security besides the physical possession of strategic materials, and the United States has long pursued a policy of stimulating international trade as the best means of strengthening the position of friendly democracies abroad. It is to the credit of the special committee that it gave full recognition to the importance of this aspect of the imports problem. It certainly presents a dilemma: The United States cannot simultaneously pursue the policies of restricting imports and stimulating world trade. Not for the first time in international affairs, a compromise solution has been attempted.

At the time the revision of Districts I-IV quotas was being considered early this year, a mission consisting of USA federal and state officials visited Caracas and consulted with the Venezuelan government. The fact that the USA administration desired to exchange views with all interested parties, including the petroleum exporting countries, created a very favorable impression in Venezuela and strengthened the spirit of international cooperation which is necessary for the amicable settlement of problems of this kind.

In Venezuela, it is recognized by many that the United States has a complex task in deciding what to do about oil imports, and there is a sincere desire to cooperate in the correction of the present worldwide oversupply situation which is the root of the problem. We can be sure demand will eventually resume its strong growth. It will be to everyone's benefit if meanwhile the entire world oil industry exercises some restraint. END

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Shell Builds Big Lake Terminal

(Continued from page 61)

hot line, and 440,000 b/d at 455 psi for the 31-in. cold line. Six main-line pumps will pump the Cabimas crudes, as well as the transit crudes, through the appropriate lines to Puerto Miranda. Three pumps will operate in series on the cold line; two on the hot line; and the sixth unit will be manifolded as a common spare. The pumps will be driven by 2,100-hp and 2,500-hp electric motors, respectively.

Four booster pumps of 700 hp each will serve a similar purpose to the pumps at Lagunillas, but four 46 x 10^6 Btu heaters will be required to provide the necessary heat input to raise the crudes to a sufficient temperature prior to pumping the oil from Cabimas to Puerto Miranda.

At Peurto Miranda, up to 12 different crudes from the Bolivar Coast will be received into twenty-three 170,000-bbl floating-roof storage tanks, and two 46 x 10^6 Btu heaters will enable reheating of the heavy crudes whose temperatures drop to undesirable levels during storage. Nine loading pumps, capable of delivering at a rate of 4,000 tons per hour, will be installed in three groups, situated as near as possible to the tanks from which they take their suction; six will be used for the heated oils, and three for the lighter cold oils. No specific standby pumps are incorporated in the design, but it is anticipated it will be possible to use the pumps indiscriminately as and when required.

Initially, only two jetties—one of 330 m and the other of 370 m—will be built. They will be able to accommodate up to seven tankers simultaneously—including one tanker of 65,000 dwt. The oil will be transported from the loading pumps to the power-operated loading arms through eight 30-in. lines—which will be without designation as to crude carried, but will be divided into heated and cold lines in the same ratio as the volume of the relative crudes produced.

All other services normally required at loading terminals—such as deballasting and skimming facilities, bunkering facilities, supply of potable water, and fire protection—will also be provided at Puerto Miranda.

In addition to loading the crudes from the Bolivar Coast, a heavy crude from the Boscán fields on the west side of Lake Maracaibo will be received through a 16-in. pipeline, and will also be loaded over the Puerto Miranda jetties. The storage tanks, loading pumps, and heaters for this crude are independent of the North Terminal facilities, and only a portion of the main loading lines and dock installation will be used.

To cope with the increased power demands as a result of the construction of the NTS, one of Shell's existing power plants on the Bolivar Coast will be extended. Puerto Miranda will have its own power supply independent of the company's Bolivar Coast distribution system, and it is planned to erect a 10,750-kw power plant at the terminal site.

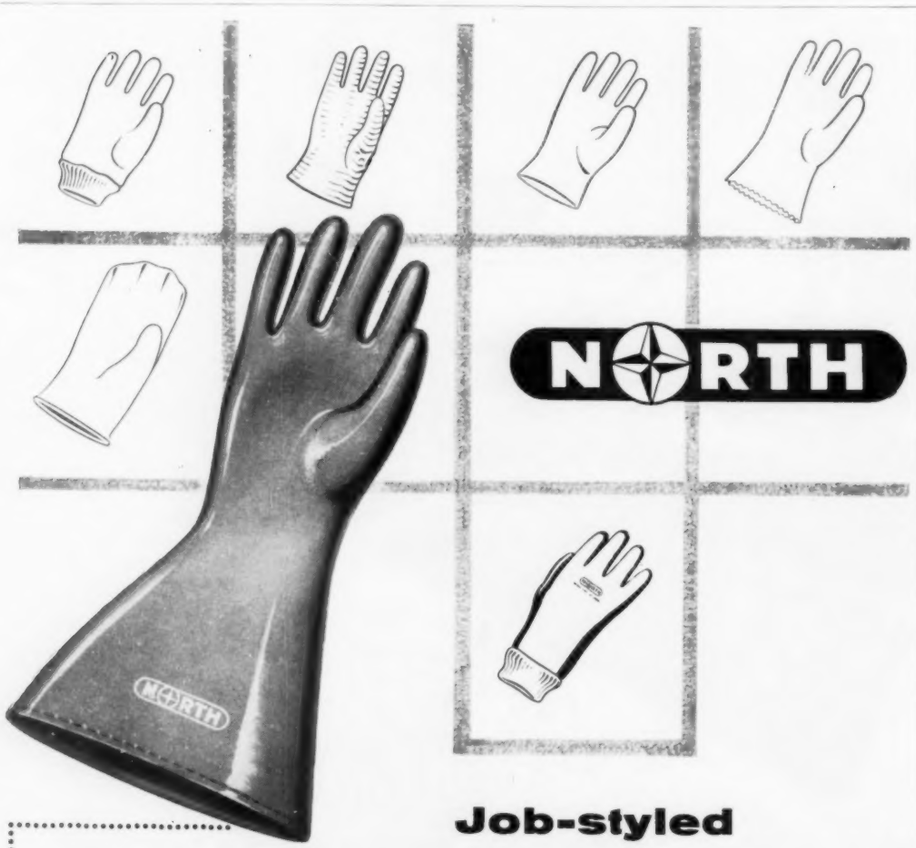
An interesting feature of the NTS is the automatic control which has been incorporated into the design at all stations to provide: (a) automatic tank-level and temperature gauges, printing and transmitting the required information at regular intervals; (b) flow meters, continuously indicating all the main flow rates at a central control room; (c) instruments using the crude's dielectric constants as an index used to check oil interfaces; (d) gate valves remotely controlled, synchronized, and power-operated; (e) automatic safety shutdown devices on all the main lines and heaters; (f) valves fitted with interlocks to prevent starting of the centrifugal pumps while the suction valves are closed.

Numerous other safety controls are also built into the design, and these will insnare satisfactory operations, even during an emergency breakdown of part of the installation.

Communications, for overall administration and for operational control, will be available on clear channel voice and teletype circuit.

The Boscán part of the Puerto Miranda installation is already in operation, and construction of the remainder of the project is now well under way. A part of the installation to handle up to 350,000 b/d will be completed and in service early in 1959.

END



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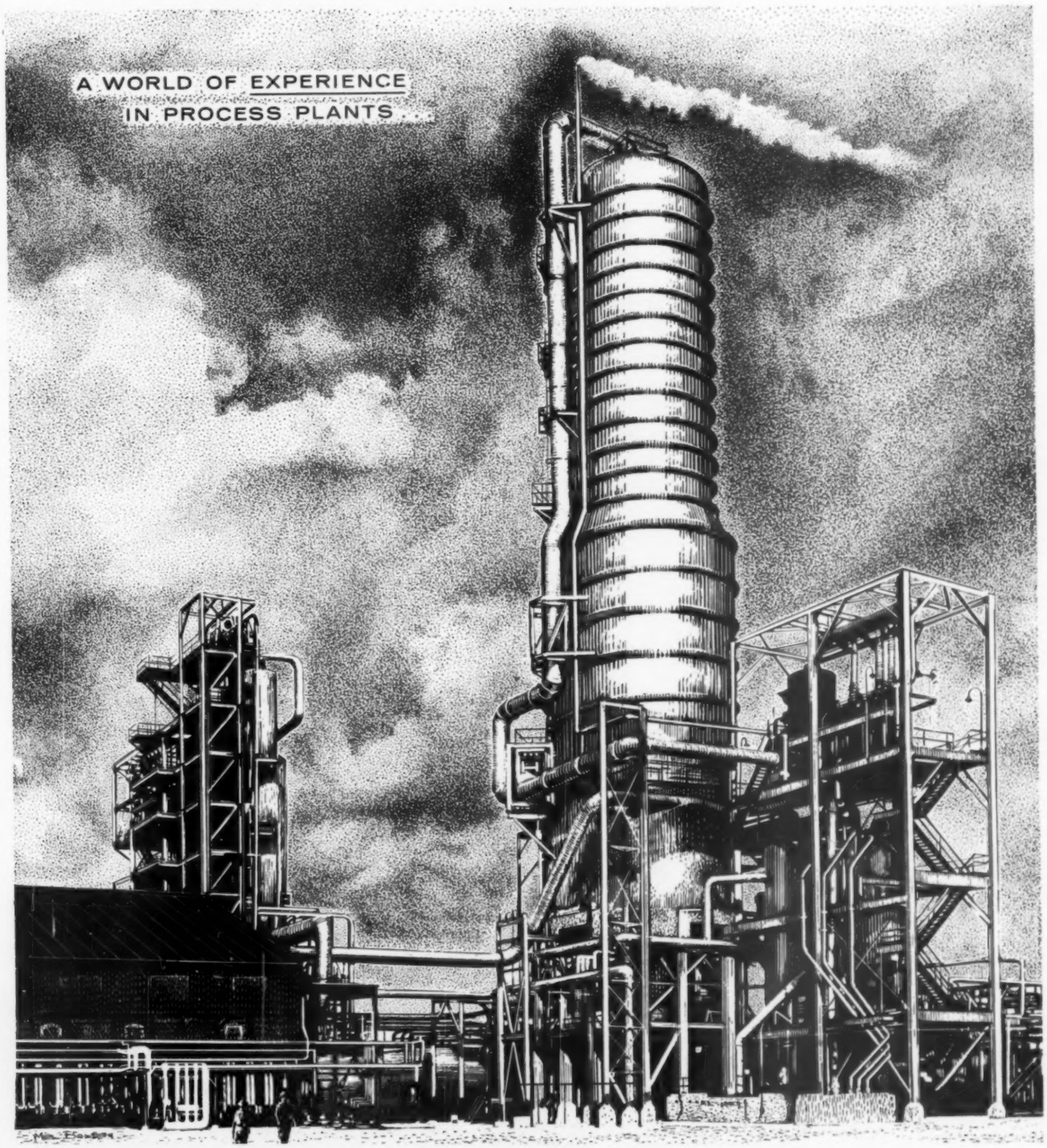

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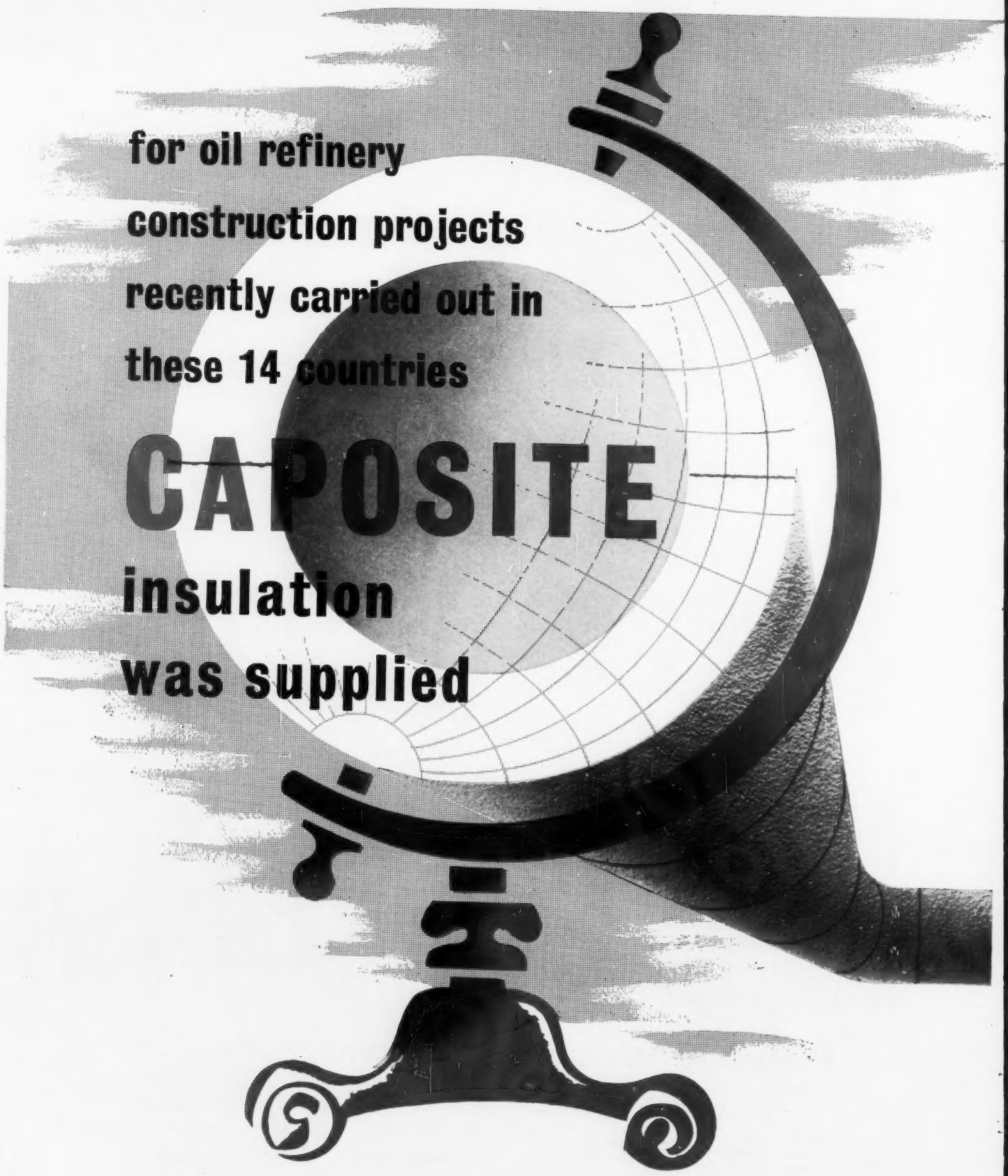
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Canada's Borden commission examines oil

by Frances von der Lin

Editor's Note: Submissions to Borden commission on gas appeared in the May 1958 *World Petroleum*. Following summarizes sentiment of submissions on oil.

INVESTIGATIONS by the Royal (Borden) Commission into Canada's energy resources have erupted into an industry-splitting battle as to best strategy for liberating western Canada's shut-in crude oil. A drive by independent Canadian oil companies (over opposition from the majors) for an Edmonton-to-Montreal crude line gained momentum this spring during commission hearings. The proposed $350 million large-diameter (30-in.) project was outlined by Home Oil Co. Ltd., spokesman for a 12-member group. Further headway will be determined largely by commission recommendations in an expected interim report to the Diefenbaker government.

It is generally agreed western crude cannot displace tanker-borne Venezuela or Middle East crude in the 200,000 b/d to 250,000 b/d Montreal area without federal government protection against foreign imports—and without such an embargo Montreal refiners will not jump into long-term (20- to 30-year) agreements for western crude in "preference" to foreign crude. As alternate, these companies have proposed expansion of the Ontario market and recapture and expansion of markets in the Pacific Northwest and north central areas of the USA. The commission has been warned the proposed new crude line may become a liability with the inevitable expansion of "natural" markets in Ontario and the USA. Canada's largest independent integrated oil company joined the majors in this conviction: ". . . if Middle East or South American crude producers drop their prices . . . inevitable result could be lowering of well-head prices of Canadian crude . . . where developing of a basic normal resource becomes unattractive . . . our crude oil will certainly find its way into natural markets in the Puget Sound and northwestern and upper Mid Continent area of the USA . . . we do not want to be saddled with a $250 million pipeline and a long-term commitment to supply 200,000 b/d to 250,000 b/d of our crude oil to a market which could only be substantiated by artificial means."

Imperial Oil's president J. R. White took exception to the term "commercial preferences" in regard to the use of foreign crude in the Montreal refining area: "Our position on the Montreal market . . . is simply that it has the attraction of large volume, but it has certain important disadvantages relating to the basic noncompetitive position of Canadian crude there, and the trade restrictions that will be necessary to support the use of Canadian crude . . . it would be most unwise . . . to place Canadian crude physically in Montreal . . . other alternative courses of action must be fully explored."

Besides Imperial's Montreal East refinery, four other refineries in the Quebec area operate on foreign crude: British American, Canadian Petrofina, McColl-Frontenac, and Shell of Canada. Submissions at Calgary sessions included three of them, and Canadian Petrofina is expected to be heard in July in Montreal.

Feasibility of alternative courses to the proposed line to Montreal has been criticized on grounds of insufficient proof as to when or to what extent markets in either Canada or the USA will be expanded. As noted by Alberta's Premier E. C. Manning: "The quota system is responsible for casting serious doubt on the long-term future role of these USA export markets as major outlets for Canadian crude."

Summarizing, he said, "in view of the representations . . . by some of the integrated oil companies . . . industry should be given an opportunity to solve the problem. . . . If industry cannot produce a solution that can be applied speedily, or if its solution falls short of being adequate . . . I see no valid objection or reasonable alternative to a system of enforced import quotas . . ."

Two recommendations during the hearings were supported by the premier, and the commission may press for their implementation: Senior officials of refining, importing, transporting, and marketing companies—at a conference to be called by Prime Minister Diefenbaker—would work out solutions within a prescribed time. In the meantime, the hardest efforts yet would be made to negotiate with the USA government, at cabinet level, for re-establishment and expansion of markets for Canadian crude—preferably under a philosophy of continental defense and interrelationship of Canadian and USA crude reserves. A Western Hemisphere concept of oil marketing also has been seen as a satisfactory approach. At both the industry meeting and cabinet-level conference, it would be emphasized that failure to achieve satisfactory solutions would mean import quotas on USA crude and refined products to pave the way for economic operation of the proposed Alberta-Quebec pipeline.

Instead of the proposed Alberta-to-Montreal line, most frequent proposal to the commission by the majors was to step up use of western crude via expanded refinery capacity—mainly in Ontario, Canada's largest market for products. Products now refined in Montreal from foreign crude and shipped into Ontario via the Trans-Northern Pipe Line would be displaced increasingly by products refined locally from western crude. Majors made optimistic forecasts—among them one that a high degree of saturation of the Ontario and Puget Sound markets would mean outlets for 812,000 b/d by 1962—with 567,000 of this domestic and 245,000 for export.

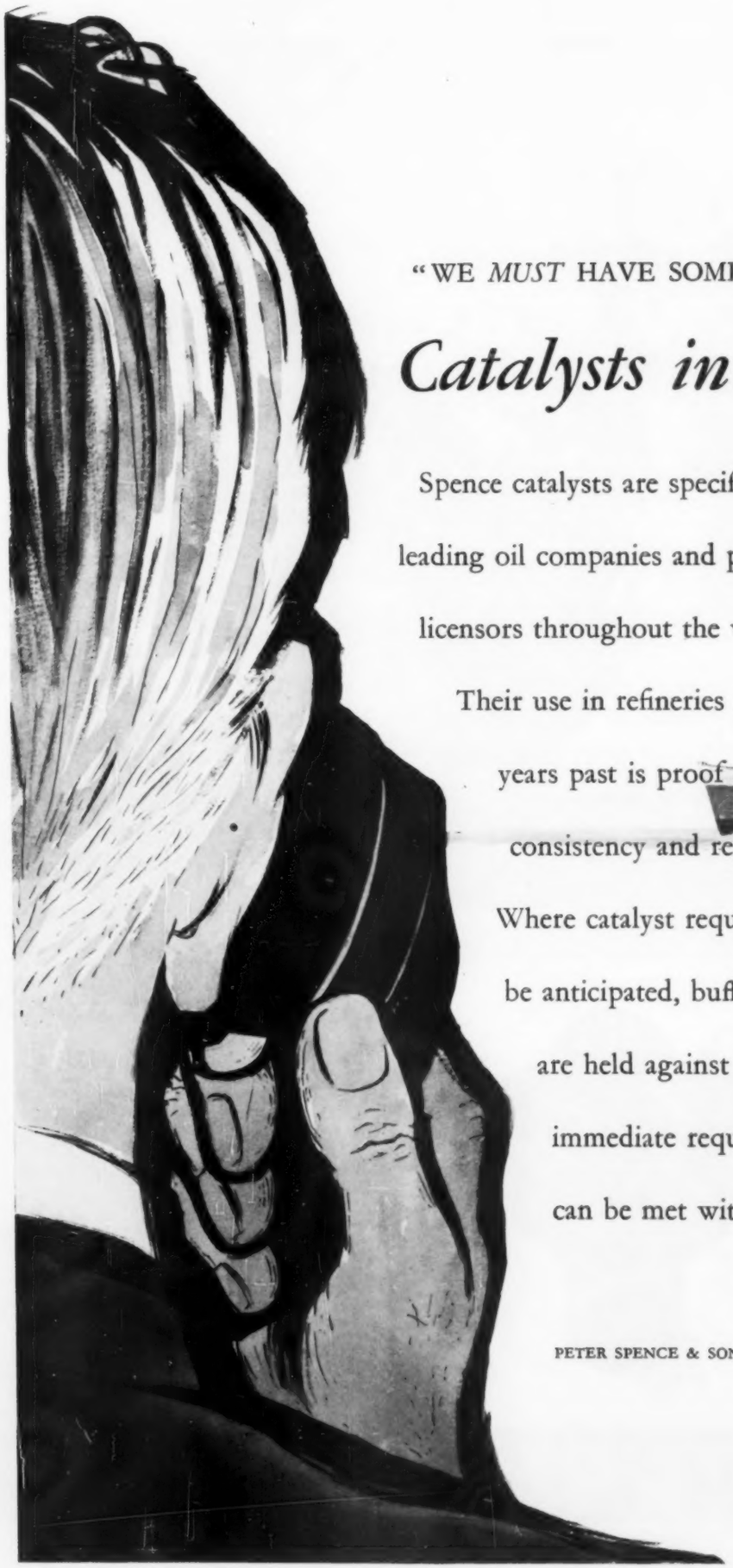
Meanwhile engineering studies for pipeline routes to Montreal have been completed for the Home Oil group by Dutton-Williams Bros. Ltd. The group contends "Alberta crude could be laid into Montreal now for $3.16 per barrel . . . less than the laid-down price of comparable Venezuelan crude." The group noted that, in the report by New York consultant Walter J. Levy, Toronto requirements of crude by 1965 would exceed indicated capacity of the Interprovincial Pipe Line.

Should it develop the pipeline must be built, Canadians wish speedy decisions as to their course in answer to world oversupply of crude. Construction once under way, completion would take about two years. The majors believe this would be just about the time, ironically, when large volumes of Canadian crude would be welcomed into expanded USA markets. Stated B-A's submission: "Any temporary decline in exploration activity which may be due to insufficient revenue from production to finance further exploration will be largely corrected by 1962, even without the Montreal market which could not be served by pipeline before 1961 at the earliest. . . . The pipeline could become a future source of economic embarrassment in committing a substantial volume of Canadian crude to this market over the long term in view of the potential export markets economically more favorable to the Canadian producer."

Even consultant Levy recommended that Canada forego the Montreal market plan if attractive alternatives can evolve within a reasonably short time. However, he believed it unlikely problems facing Canada's oil industry will be cleared up within three years. Dr. Levy told the commission alternative prospects for expanded outlets should be pinned down without delay; and, if these do not materialize, the pipeline project should be started "the next construction season" because delay upsets the entire industry.

At all sittings before the commission, proposed establishment of a National Energy Board has been vetoed impressively. There's regulation enough already. Despite its problems, the industry has fared admirably under a system of free enterprise.

END



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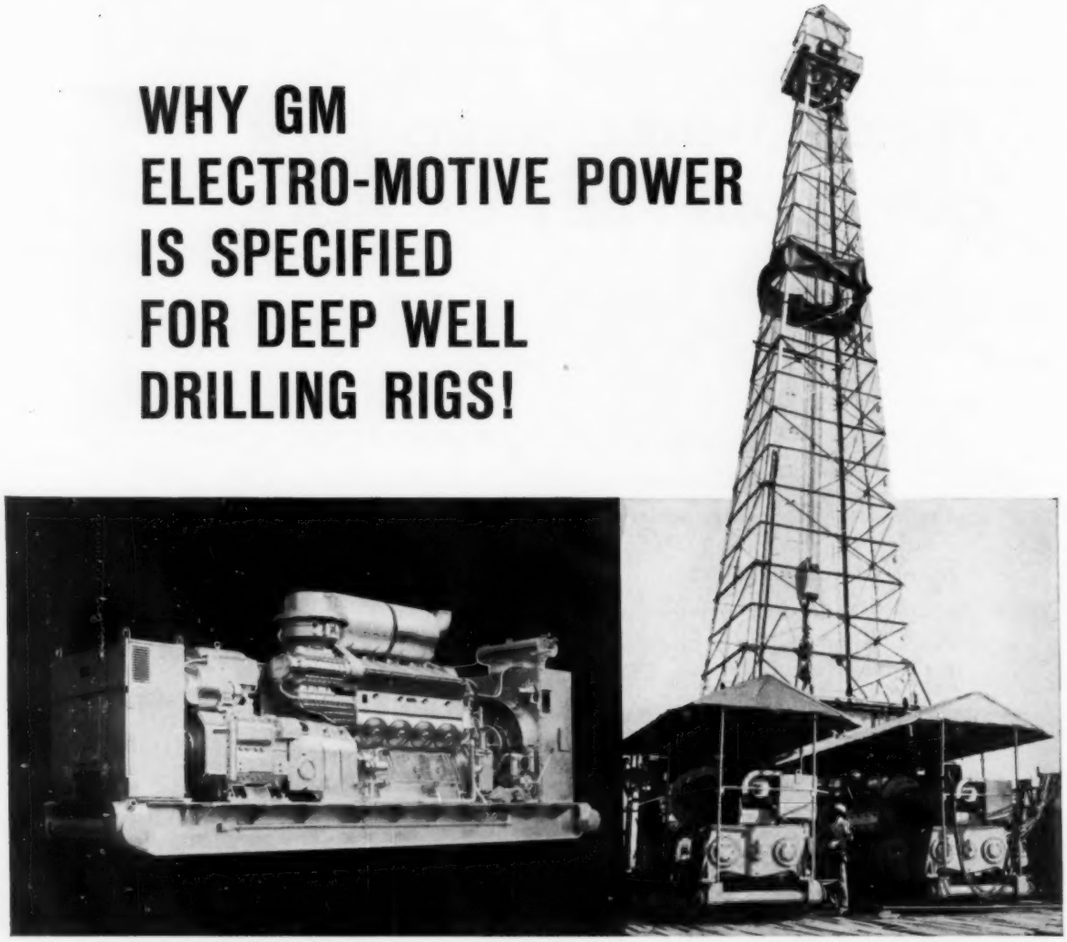

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Exploration High

(Continued from page 53)

made of a part of the Acosta area in eastern Falcon. At least one deep exploratory well is programmed for Richmond's concession acreage west of Lake Maracaibo. Surface geophysical mapping has been started in the Tachira Gap area, in the southern part of the Maracaibo basin.

In eastern Venezuela, no surface geological parties operated in 1957, and none are programmed in 1958.

Richmond participated in a joint gravity survey of the Gulf of Paria (2⅝ months) and a joint seismic survey in the Delta Amacuro (1 month) in 1957 and, in addition, performed a gravity-seismic survey in the Tuy valley on the Caribbean coast, west of Barcelona.

Additional gravity and seismic operations have been completed in 1958—with several other companies participating—in Caribbean waters off the Tuy valley. Participation in the Delta Amacuro seismic survey has been continued, and a gravity survey is programmed of the Rio San Juan area, near the Gulf of Paria.

No exploratory drilling was done by Richmond in eastern Venezuela in 1957. However, plans were matured for a 9,000-ft Miocene test near Maturín. This well, to be drilled jointly with Compania Espanola de Petroleo SA is scheduled to spud about mid-year 1958.

San Jacinto Petroleum Corp.: Through its wholly owned subsidiary, San Jacinto Venezolana CA, San Jacinto Petroleum began its Venezuelan operations in the fall of 1956. At that time, San Jacinto—together with subsidiaries of Tennessee Gas Transmission Co., Union Oil & Gas Co. of Louisiana, Monsanto Chemical Co., and Murphy Corp.—acquired from Venezuelan Leaseholds CA Block 575—consisting of approximately 2,000 acres in Lake Maracaibo, together with a border concession of approximately 25,000 acres in the state of Apure. Venezuelan Leaseholds CA retained a 50% net-profits interest, which was later retired in a transaction which resulted in adding to the owner group the subsidiaries of The Sharples Oil Corp. and American Petrofina Inc.

San Jacinto, operator for the group, entered into an agreement with Perforaciones Delta CA for the construction of a drilling rig and barge to conduct drilling operations on the block. This barge, Delta IV, was constructed in Houston during the winter of 1956 and the spring of 1957, and arrived at the location of Marlago in June of 1957. Since the latter date, drilling operations have been conducted continuously with Delta IV, and one well has been drilled with a barge of Offshore Venezuela CA. Four wells have been completed on the Marlago block, with an aggregate potential on initial production tests of approximately 20,000 b/d; and a fifth well was nearing completion. All completions to date have been in the lower Lagunillas section of the Miocene, and San Jacinto regards more than half of the block as proven in that formation. The production from the lower Lagunillas is of 27-gravity.

Two other Miocene sands have been encountered in all wells on the block, and San Jacinto regards the Eocene possibilities as good. However, because of the difficulties of handling more than one type of crude, the company's present plans call for concentrating on lower Lagunillas development.

At present, production from the Marlago block is handled through a temporary flow station consisting of an anchored barge with separation facilities. Production from the barge is pumped to shore through a 12-in. submarine line extending approximately 11 miles to San Lorenzo. At San Lorenzo, San Jacinto has storage facilities adjacent to the Shell pier, and has made arrangements with the latter company for a three-year period under which production from Block 575 can be loaded onto tankers through Shell's loading facilities at San Lorenzo.

Construction will start shortly on a permanent flow station of a design sufficient to handle up to 50,000 b/d and, concurrently, the company will expand its storage facilities at San Lorenzo, and will make the necessary additions to Shell's loading dock to accommodate this volume of production.

San Jacinto also participated in the second round of concession sales which was held in Venezuela in the early part of 1957. In that sale, San Jacinto—acting for itself and certain associates to the extent of an undivided 25% interest, and for Phillips Petroleum Co., Sunray Mid-Continent Oil Corp., El Paso Natural Gas Co., Western Natural Gas Co., and Pacific Petroleums Ltd.—acquired Block 10 comprising approximately 25,000 acres in Lake Maracaibo and a border concession of the same size in the states of Tachira and Zulia, at an aggregate cost of about $49 million. Phillips Petroleum Co. is operator of the block. San Jacinto, for its own account, entered into another agreement with Perforaciones Delta CA for the construction of a drilling barge to operate on the lake. This barge was made available for operations on Block 10; and, on October 16, 1957, commenced drilling operations on the first well in the northwest corner of the block. That well was completed with an initial potential of 4,080 b/d in the Eocene. At present, a second rig, belonging to Offshore Venezuela CA, has been employed for drilling operations on the block, and two wells are being drilled—the first, two locations southeast of the initial well, and the second on a separate geological structure nine miles east of the first well. Indications at present are that substantial Eocene production will be available from Block 10. However, plans for handling Block 10 oil cannot be formulated until further development of the block.

The conduct of operations in the lake requires the maintenance of considerable onshore facilities. For the purposes of operations on Block 575, San Jacinto has taken one of the lots in the Las Morochas development of Terminales Maracaibo CA, which it will use for the storage of materials and equipment. Phillips Petroleum Co., which also operates Block 17, has constructed a terminal on the west shore of Lake Maracaibo, south of the city of Maracaibo, which is jointly owned and will be jointly used by the Block 10 and Block 17 groups.

At December 31, 1957, San Jacinto had spent a total of approximately $16 million for the acquisition of concession interests—inclusive of the share which it and its associates spent in acquiring the Block 10 interest. Drilling and development costs at that date had amounted to approximately $1,200,000. For the current year, the company is budgeting $6,750,000 for drilling and capital expenditures in Venezuela.

In spite of the heavy expenditures which it has made in Venezuela, and in spite of its participation in foreign producing operations prior to 1957 through the Iranian consortium, San Jacinto has no import quota. This result is brought about by the fact that, under the current voluntary plan, quotas assigned on an historical basis are limited to companies and individuals which had planned to import crude in the latter half of 1957—this being a period during which the company had arranged to move its Iranian production outside the USA, and by the fact that new importers have been so defined as to exclude companies not having USA refining facilities.

San Jacinto has entered into a contract with Douglas Oil Co. of California under which it will supply the foreign crude requirements of the latter company. Douglas has an existing refining capacity of approximately 20,000 b/d, about 220 service stations throughout California, and an existing import quota of 4,700 b/d. Douglas has recently applied for an increase in its quota to 11,000 b/d.

In spite of the difficulties facing the producer of Venezuelan oil, the officials of San Jacinto seem confident of their ability to expand their markets in pace with their expanding production. With Iranian production sold through 1961, with the Douglas contract covering their existing producing capacity, and with proposals under negotiation for the disposition of their incremental production, they believe that, although problems may lie ahead, persistence, hard work, and a flexible approach will solve them.

Compania Shell de Venezuela: In 1957, CSV obtained one block of concessions of 10,000 hectares in the Gulf of Paria.

In western Venezuela, five exploration wells were drilled to total depth. One of these wells, VLD-192X—located in the new lake concession near San Lorenzo—was completed as a good producer. Two other wells, viz., VLE-196X, on the new concession in central Lake Maracaibo, and VLC-107X in Block 3 in the lake, were suspended at the end of the year.

Two of the deep exploration wells, MG-745X in the Mene Grande field, and VR-1X in the Villa de Rosario concession south of Maracaibo, did not find any oil indications. At the end of the year, drilling was in progress at three other exploration wells—two of which were located on new concessions in central Lake Maracaibo. In eastern Venezuela, an agreement was made with the SA Petrolera Las Mercedes—through which that company would drill several wells on CSV's Unare concession, for an option to obtain an interest in these concessions. At the end of the year, seven wells had been drilled—two of which were completed as small producers, one was suspended, and four others failed to find oil in commercial quantities and were abandoned.

During the year, CSV did seismic work in Lake Maracaibo, the Gulf of Venezuela, and in Delta Amacuro. The company also participated with other companies in regional studies in Gulf of Venezuela, Gulf of Paria, and Barinas. In the last quarter of the year, CSV participated with four other companies in a gravity survey in the Gulf of Venezuela.

Surface geological studies were made in the states of Cojedes and Falcon.

Two wells (VLE-198X and VLE-212X), in CSV's central lake concessions, were drilling at the end of 1957, and were carried to final depth and suspended early in 1958. The rig has been moved out of the area.

An exploratory well (MGB-1X), south of the Mene Grande field, was drilled to a total depth of 12,010 ft and suspended. A second exploratory well in this general area is drilling, and the rig will probably continue to work in this area for the rest of 1958.

Seismic work in Delta Amacuro is continuing, and a seismic survey on the company's concession in the Barua area, south of the Mene Grande, has been started. Some surface geological studies are being carried out.

Socony Mobil Oil Co. de Venezuela: During the dry season, December through March, five parties—two geological and three reflection seismograph—were in the field. Two surface geological parties spent December on reconnaissance studies in the Carora-Barquisimeto area, state of Lara; and, January to March, inclusive, on detail-reconnaissance in the Guanare-Acarigua-San Carlos-El Pao areas, states of Portuguesa and Cojedes.

Eleven party-months of detail-reflection work were done by three seismograph parties during the four-month period beginning December 1, 1957. Of this total, one party-month was spent in the Rincon area, 18 kilometers south-southwest of Anaco, state of Anzoategui. The remaining 10 party-months were confined to mapping in the state of Barinas within a narrow belt paralleling the Andean front between Ciudad Bolivia and San Antonio de Caparo, and within an isolated area along the Caparo River about 75 kilometers east of the mountain front. During this season, output per party-month averaged 100 kilometers of reflection profile.

A total of 15½ rig-months of exploratory drilling were carried out in the five-month interval November 1957-March 1958 inclusive, consisting of 8.31 rig-months in the eastern division and 7.19 in the western division. Exploratory drilling results are summarized in accompanying Table 2.

Signal Oil & Gas of Venezuela: During the past 12 months, the company drilled four wells on Block 4 in Lake Maracaibo. The first well, Centro 1X, was suspended at a depth of 9,470 ft. The company expects to deepen this well to the horizons which have proved productive elsewhere in the block. Centro 2X was completed for 2,500 b/d of 43 API gravity oil through a ⅝-in. choke in the C-5 horizon between 12,113 ft and 12,183 ft. Centro 3X came in for 3,000 b/d of 42 API gravity oil in the C-5 horizon between 11,807 ft and 12,184 ft. Centro 4X tested 5,138 b/d of 27.5 API oil from the C-2 horizon between 10,044 ft and 10,200 ft; and, later, on a one-hour test, the well flowed 43.4-gravity clean oil at the rate of 3,800 b/d, through perforations between 12,282 ft and 12,353 ft. The well is drilling at 12,500 ft. Centro 5X was spudded, April 25, approximately 4½ miles northwest of Centro 4X.

Venezuelan Sun Oil Co.: At the end of March 1958, this company as operator for itself, Venezuelan Atlantic, and Seaboard Oil Co., announced completion of two wells as oil producers in the group's Lake Maracaibo Block 1 concession. SVS 8, completed in the Eocene, tested at the rate of 6,350 b/d of 35.2 API gravity oil through a ¾-in. choke. The well was flowing through perforations from 7,771 ft to 7,789 ft, and from 7,795 ft to 7,842 ft. SVS No. 7, completed in the Icoeta horizon, tested at the rate of 3,240 b/d of 33.9-gravity oil through a ½-in. choke.

Signal has been carrying out geological and geophysical exploration in other parts of Venezuela, and will continue this activity during the ensuing 12 months. It will also step up drilling on Block 4 with the addition of a second drilling barge which arrived recently.

Early in May, the group announced two more completions in Block 1—SVS 9 and SVS 10. SVS 9 tested 7,416 b/d on a ¾-in. choke, through perforations from 9,408 ft to 9,678 ft, and encountered about 1,400 ft of oil sand. SVS No. 10 tested 4,536 b/d of 34-gravity oil, on a ¾-in. choke, through perforations from 7,850 ft to 7,900 ft. Total depth was 8,211 ft, and thickness of oil-bearing sand about 250 ft. END

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RESIDENT REPRESENTATIVE—CHICAGO AND MORE THAN 775 BRANCHES ACROSS CANADA

Gulf Starts First Bolivian Test

Bolivian Gulf Oil Co. is using a drilling rig capable of going to 17,000 ft in starting its first experimental well in Bolivia. The well is southeast of Camiri, in Mandeyapecua.

Shell Venezuela's Expansion

Capital investment in additional fixed assets during 1958 of Cia. Shell de Venezuela, Caracas, will reach 668,000,000 bolivares, compared with 623,000,000 announced for the previous year—excluding direct or indirect operational costs, taxes, etc. Among the large-scale projects will be construction of the deep-water terminal on the east coast of Lake Maracaibo, called Puerto Miranda, and the completion of a new distillation unit in the Cardon refinery.

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One of three new barite plants in Venezuela and Trinidad is this Barvensa plant at Punta Camacho on Lake Maracaibo. Such local mills speed service.

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Venezuela's Oil Ministry

(Continued from page 56)

which grantees are legally bound to submit to the ministry; evaluation of oil and gas fields under exploitation; and estimation of oil and gas reserves.

Drilling Section: This section is in charge of a chief engineer. Its duties are as follows: study of drilling operations during various stages—including approval of drill-in locations, study of oil companies' drilling schedules, study of procedures in the drilling and piping of wells, compilation of data relating to superficial exploration, negotiating refining and transportation concessions, etc.

This section pays special attention to drilling schedules of oil companies and to changes in productive horizons in existing wells. The first is of prime importance because the oil-production potential of the country and the income received by the treasury will be in direct relation to the number of producing wells sunk and completed each year. Likewise, the second requires careful watching, because unwarranted changes in the productive horizons before they are truly exhausted may mean the loss of oil still recoverable.

At present, and in the absence of a special section, this section also had to study and handle, as previously stated, installation plans relating to refining and transportation of oil and its derivatives; to authorize or disapprove transportation rates to third parties through oil and gas lines. All of these are matters of great importance because they involve large investments of money.

Statistical Section: This section is in charge of an engineer; it also has at its service four estimators. The activities of this section are the compilation of the annual reports and the work schedules which, according to the regulations of the Hydrocarbons Law, the grantees must present on January 31 of each year. These annual reports contain data relating to such matters as concessions, exploration, exploitation, transportation, reserves, camps, sanitation and social aid, and wages and salaries of the industry. This section has been in operation since 1956, and from it have emanated the majority of the statistical data currently in use to analyze the development of the petroleum industry in most of its aspects.

Secretary's Office and Archive: This office is in charge of a section chief, assisted by three correspondents and six officers. It handles all matters relating to secretarial and filing work, such as the typing of all official correspondence, memoranda, resolutions, statistical reports, radiograms, etc., dispatched by the division, and classifying and filing such documents.

Production and Fiscal Division: The functions of this division are: (1) to prepare and render to the Hydrocarbons Administration an account of the matters handled by the division; (2) to carry out the orders by direction; (3) to estimate each month the amount of tax on hydrocarbons which must be paid by oil companies operating in Venezuela; (4) to check or verify the daily oil production of the country; (5) to prepare statistical tables on production and exports of oil, gas, and refined products, on taxes from hydrocarbons, on transportation and storage of hydrocarbons, on hydrocarbons consumption in and outside of Venezuela, etc.; (6) to study and prepare any reports of a technical nature, economic or administrative, relating to the petroleum industry; (7) to make petroleum analysis for setting petroleum standards or references for use in determining the commercial value of Venezuelan crudes under exploitation; (8) to make technical and administrative studies of construction projects carried out by oil companies in their installations, and to prepare corresponding reports approving or disapproving such projects; (9) to study applications for the establishment of rights-of-way, and to prepare corresponding reports approving or disapproving such rights; (10) to study reports on accidents occurring in the industry in order to impose or waive corresponding penalties; (11) to make frequent and regular analysis of the various aspects of the world petroleum industry.

Cartography and Archives Division: Functions of this division follow the regulations of the Hydrocarbons Law relating to the method of handling of applications for concessions already approved and ready for granting by the national executive, and relating to the presentation of sketches and plans for such concessions. This section includes expirations, relinquishments, and transfers of concessions in force.

Another function of this division deals with the disposition and preservation of official documents relating to concessions, including plans of such concessions. It also prepares plans of groups of concessions, and keeps them up to date.

For all these operations, the division maintains a staff of engineers specialized in cartography, and a section for applications for concessions already approved and passed on by the Minister of Mines and Hydrocarbons for handling in accordance with the regulations of the Hydrocarbons Law.

The final objective is to keep a file of all concessions and their plans—with all transactions and publications covering the entire period they are in force. This enables the division to keep a complete record of all concessions whether in force or not. The division does not concern itself with the estimated or actual production of these concessions. During the period of negotiations, there may be certain problems such as the correction of plans, etc., which are handled with the utmost care so that everything will be according to law.

There is a plan to call this division the Départmento Técnico de Concesiones, or Concessions Department—including an Office of Legal Reserves and an Office of Geological and Geophysical Explorations, for the purpose of evaluating oil fields. END

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for oil well drilling. Some of their most remarkable features are: Absolute reliability, long service life, outstanding performance with low weight and economical fuel consumption. All components are conveniently arranged and easily accessible, facilitating control during operation and maintenance. Details and offers are submitted upon request. Our sales engineers will be gladly at your service with their expert advice, without obligation.

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Daimler-Benz AG. Stuttgart-Untertürkheim (Germany)

Superior's Story

(Continued from page 59)

Superior recently purchased three 52-ft-long diesel-powered launches which are used for the transportation of the company's supervisory personnel. It has been found that the longer, more powerful boats offer greater time savings and much smoother transportation due to the particular wave lengths in Lake Maracaibo's chopping waters. One of these boats is of all-aluminum construction, while the other two are steel hull boats. The launch of aluminum construction will make the trip of 39 miles from Superior's San Francisco terminal to the Lama lease in about 1 hour and 20 min.

The Superior Oil Co. of Venezuela will continue to drill in Lake Maracaibo, and feels that the years and money spent in the development of this area will be as fruitful as any other operations of The Superior Oil Co. Due to the present voluntary import program, it is very difficult for us, or any other oil company in Venezuela, to know how far ahead we should plan our drilling and how much money we should invest until we know how much oil we can contract to sell per day. We do, however, believe that in the years to come there will be a great market for this newly found crude. END

One of the Shell drilling barges on Lake Maracaibo. Four Paxman sets provide power for the slush pumps and two more Paxman engines drive alternators for power. Shell photograph.

OIL... *in Western Venezuela*

Crude oil output in Venezuela, one of the world's leading producers, comes mainly from the western part of the country, in the Lake Maracaibo area, although fields in Eastern Venezuela contribute approximately a third of the total production.

Amongst the diversity of drilling equipment in service in this oil-producing area, Paxman diesels are doing a job of unfailing service driving draw-works, rotary tables and slush pumps, both up country and on offshore rigs. These engines come from a range of "Drilpak" sets, developed from 16,000,000 hours drilling experience, known by oil men everywhere for their sound performance, rugged construction and dogged dependability. Paxman engines for oilfields duty are built in two power ranges. Engines having a common bore of 7 inches give you a power range of 100-1,000 b.h.p. In the 9¾ inch bore range of fabricated steel frames engines an output of 480-2,100 b.h.p. is available.

A Paxman engined Cia. Shell de Venezuela deep drilling rig at La Paz field. (From a Shell photograph)

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Petroleum Industry Consultants C.A., operating in Maracaibo and Caracas, carry a full stock of spares for Paxman engines. J.41.

Venezuela's Banner Year

Venezuela had its first billion-barrel year in crude last year, as production came to 1,014,456,710 bbl (2,779,244 b/d)—a gain of 13% over 1956. High point of production came in week ended July 1, 1957—with production of 2,952,389 b/d. Low point was the week ended December 23—with 2,481,448 b/d.

Consumption of locally-refined products in Venezuela last year was 29,352,883 bbl, an increase of 10.75% over 1956 total of 26,503,846.

Here are the details:

VENEZUELAN CONSUMPTION OF LOCALLY REFINED PRODUCTS
(Barrels)

	1956	*1957*	*% Increase*
Gasoline	11,768,018	13,100,625	11.32
Fuel oil	6,575,019	6,476,927	(1.49)
Diesel oil	3,790,599	5,126,683	35.25
Kerosine	3,118,934	3,331,524	6.82
Asphalt	1,009,771	1,102,524	9.19
Lube oils	63,240	91,972	45.63
Other products	178,265	122,630	(31.21)
Total	26,503,846	29,352,883	10.75

International bunkers (locally-refined)
(Barrels)

	1956	*1957*	*% Increase*
Fuel oil	15,078,350	18,344,445	21.66
Diesel oil	3,585,640	4,021,486	12.15
Miscellaneous	2,384	3,982	67.03
Total	18,666,374	22,369,913	19.84

Exports of petroleum in 1957 were as follows:
(Millions of Barrels)

	1956	*1957*	*% Increase*
Crude	675.29	758.80	12.37
Products	170.96	181.54	6.19
Total	846.25	940.34	11.12

Total area covered by concessions, as of December 31, 1957, was 6,681,900 hectares, less minor surrenders and expirations on which complete data are not available. Of the total, 6,181,100 hectares were under exploitation titles, and 500,800 under exploration-exploitation titles.

Well drilling slumped in the second half of 1957. Total wildcats completed in first half was 60; in second, 47. Total of development wells in first half was 868; in second, 680.

Here are the facts on well drilling:

	Oil		*Gas*		*Dry*		
	Development	*Wildcat*	*Development*	*Wildcat*	*Development*	*Wildcat*	*Total Wells*
1956	1,195	58	5	3	83	70	1,414
1957	1,463	51	3	—	82	56	1,653

In 1958 first quarter, well completions totaled 265, as follows: Mene Grande, 106; Shell group, 55; Socony, 29; Creole, 26; Atlantic, 15; Texaco, 11; Las Mercedes, 8; Sinclair, 4; Talon, 3; Venezuelan Sun and San Jacinto, 2 each; and Phillips, Richmond, Superior, and Signal, 1 each.

There were 213 oil development wells and seven dry development wells for a total of 220. There were 19 oil wildcats, one gas wildcat, and 25 dry wildcats for a total of 45.

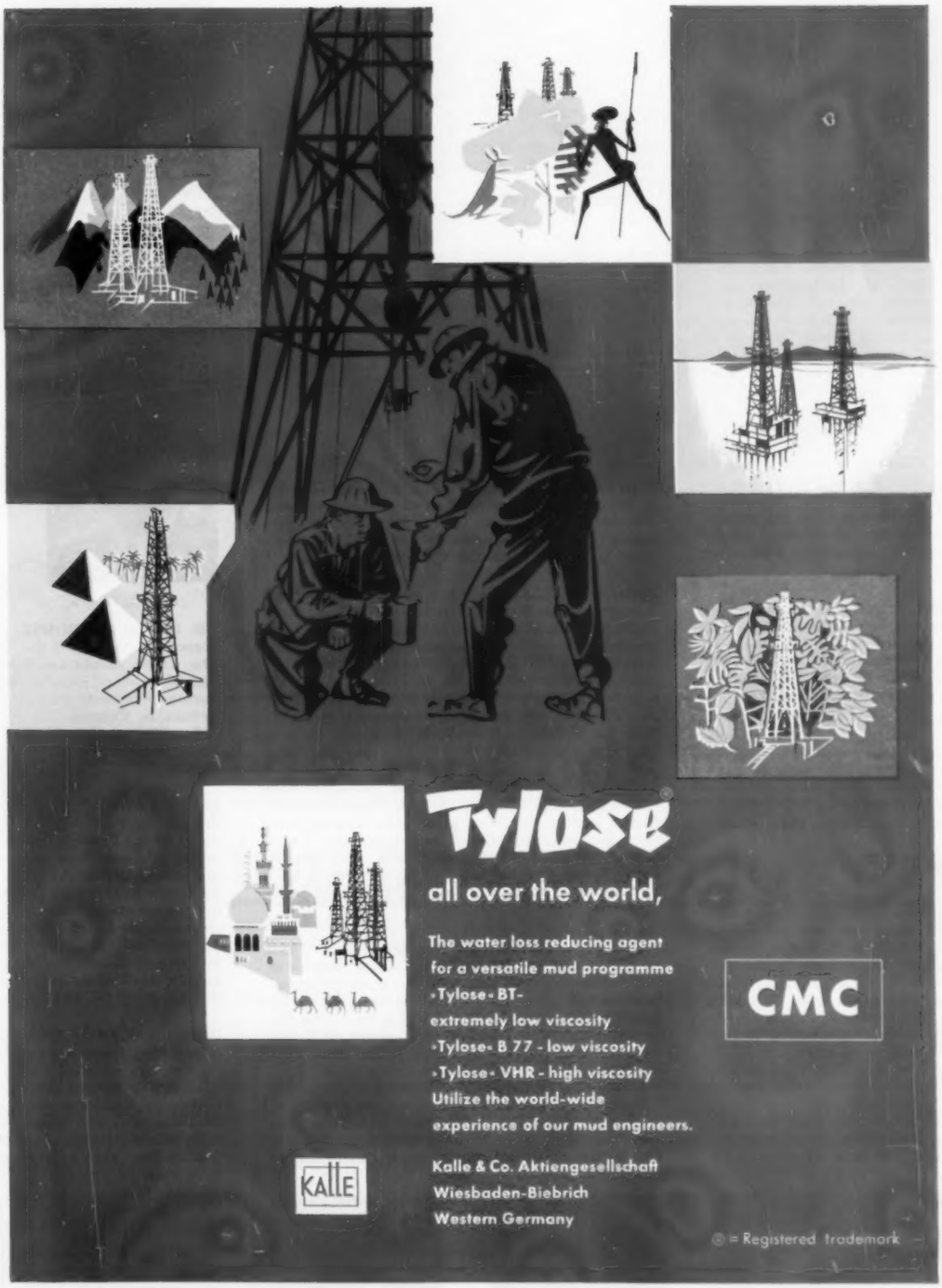
Brazil Reports for May

Crude production averaged 46,000 b/d in May. Fifty rigs were operating; five others to start shortly. At the end of the month, 12 geological, 14 seismograph, and 10 gravimetric teams were operating. The following wildcats were drilling: Amazon basin, 7; Maranham, 2; Bahia, 3; Alagoas-Sergipe, 3; Parana, 1; Sao Paulo, 1. AGC-1-BA, Agua Grande Central, Bahia Reconcavo, was under test in May.

Petrobras has been authorized to install equipment at Presidente Bernardes refinery to purify propane—capacity 43.5 tons per day.

New Brazilian Tankers

First of Brazil's new 33,000 and 34,000 dwt tankers is due for delivery in December next; three others are scheduled for delivery in 1959 and 1960. The 6,300-ton lubricant carrier is due for delivery in February 1959.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OIL COMPANY STAFF CHANGES

W. A. Campbell

W. E. Locher

W. A. CAMPBELL and **W. E. LOCHER** have been elected vice presidents of Trans-Arabian Pipe Line Co.—with headquarters at Beirut, Lebanon. Mr. Campbell, now manager of government relations, joined Tapline in 1947, and has spent many years in the Middle East. He also served as field archaeologist with the Inst. of Advanced Study in Princeton, N. J., and has been an associate professor of archaeology at Wellesley College. Mr. Locher, now manager of Tapline's operations, joined the company in 1950, and has been associated with affiliated companies since 1934. Prior to his transfer to Tapline, he had been in Venezuela with Creole Petroleum Corp. Born in Romania, he holds an MS in electrical engineering from Case Inst. of Technology.

WAYNE H. WALKER has been appointed the new manager, administrative, for Pan American International Oil Co., New York, N. Y. He will also be a director of the company. Mr. Walker has served Pan American Petroleum Corp. as procedure supervisor since 1952. He will have general supervision over staff activities—including purchasing, industrial and public relations, accounting, and other related areas.

DR. JAMES A. TONG, president of Socony Mobil Oil Co. de Venezuela, has been awarded the 1958 Alumni Achievement Award of the University of Arizona. An alumni of the university, class of 1918, Dr. Tong was selected on the basis of "achievement in his profession and contributions as a citizen."

HARRY G. SCHAD, vice president of The Atlantic Refining Co., Philadelphia, has received the degree of doctor of laws from Bucknell University. A well-known transportation expert, he was cited as being "one of the men most responsible for the economic renaissance of Philadelphia during the past decade."

Ohio's New Foreign Setup

A new assistant to the president of The Ohio Oil Co. and a top-level reorganization of the company's expanding foreign production has been announced by J. C. Donnell II, president. B. B. Miller, former superintendent at Robinson, Ill., refinery, is the new assistant. He succeeds R. M. Churchwell, who becomes manager of foreign operations, a newly created position. G. R. Schoonmaker, former assistant manager of foreign production, steps up to new position, manager of foreign exploration.

Mr. Schoonmaker will be in charge of all oil and gas exploratory activities of Ohio Oil's foreign production group. Mr. Churchwell will be in charge of foreign drilling, production, and other development activities. These men will be directly responsible to Fred J. Funk, manager of Ohio Oil's foreign organization.

E. J. MULVIHILL, Jr., vice president of Sinclair Venezuelan Oil Co., 96.24% subsidiary of Sinclair Oil Corp., has been elected to the board of that company. Mr. Mulvihill joined Sinclair in 1941 in Venezuela, and presently is the manager of its operations there. He is a graduate of Notre Dame University with a degree in business administration.

O. C. CLIFFORD, Jr., has been appointed to the newly created position of manager of the foreign crude-oil exploration division, of The Atlantic Co., Dallas, Texas. He was formerly chief geophysicist for the company's domestic exploration division.

C. H. Hightower, who had been serving as assistant chief geophysicist since 1949, will succeed Mr. Clifford in his former position.

BEVERLEY MATTHEWS, a partner in the Toronto, Canada, law firm of McCarthy and McCarthy, has been elected a director of Gulf Oil Corp. He has been a director of The British American Oil Co. Ltd. since 1955. Mr. Matthews had a distinguished war record, serving overseas for five years with the Canadian Army. He was awarded the CBE (Commander Order of The British Empire), and holds the rank brigadier, retired.

LELAND A. SMITH has been appointed a vice president of Caltex Service Co., a division of California Texas Oil Co. Ltd. He will handle marine matters for the Caltex fleets, which presently consist of 123 owned and chartered tankers.

HOWARD C. KAUFFMAN, Jr., has been appointed assistant manager of operations of International Petroleum Co. Ltd., at Talara, Peru. He was formerly production coordinator at the company's Coral Gables, Fla., executive offices.

JOHN W. MILLER has been employed as general manager of the Wrenshall refinery of International Refineries Inc. Mr. Miller has had a broad background in the oil industry, starting first as a design engineer in 1934 with the Standard Oil Development Co., in Bayway, N. J. In 1947, he served as technical supervisor for Creole Petroleum, at Casipito. He was later promoted to manager of export sales for Creole in New York, in which capacity he served until joining the refinery.

STEWART H. FOLK has accepted position as vice president of TULM Corp., Houston, Texas, consultants in foreign petroleum exploration and development for Tennessee Gas Transmission Co., Union Oil & Gas Corp. of La., Lion Oil Co., and Murphy Corp. Previously he had been vice president of Texas Gulf Sulphur Co., as chief petroleum geologist.

CHARLES F. BEDFORD has been elected vice president in charge of production and a director of Pan American International Oil Co., a wholly owned subsidiary of Pan American Petroleum Corp. He was formerly general superintendent, producing department, for Pan American Petroleum in Tulsa. He has assumed his new duties at the New York headquarters of the international firm.

A native Oklahoman, Mr. Bedford received his B.S. and M.S. degrees in petroleum engineering at the University of California. Hired in 1932 by Pan American as a roustabout at Wewoka, Okla., in 1956 he was appointed general superintendent, producing department, at Tulsa.

B. B. Miller

G. R. Schoonmaker

R. M. Churchwell

C. F. Bedford

M. L. Nee

D. H. Barran

D. H. BARRAN has been elected president of Asiatic Petroleum Corp. and Shell Caribbean Petroleum Co. Educated at Winchester and Cambridge, he joined the Royal Dutch Shell group of companies in 1934 in London, and has served in Egypt, the Sudan, Ethiopia, Israel, and India. He returned to London in 1947, and worked in supplies administration department of The Shell Petroleum Co. Ltd. In 1957 he was appointed head of supplies administration and a member of the coordinating committee.

MAURY L. NEE has been appointed assistant to vice president J. B. Christian, who is in charge of Trinidad operations for The Texas Co. Mr. Nee joined Texaco in 1957, and has been executive assistant in the company's finance and economics department.

Dr. D. A. Probst

L. A. Smith

DR. DAVID A. PROBST, petroleum geologist and economist, has joined the petroleum department of The Chase Manhattan Bank, New York. He has had 20 years of experience in the petroleum field, having been most recently with the Cie. Shell de Venezuela, Caracas.

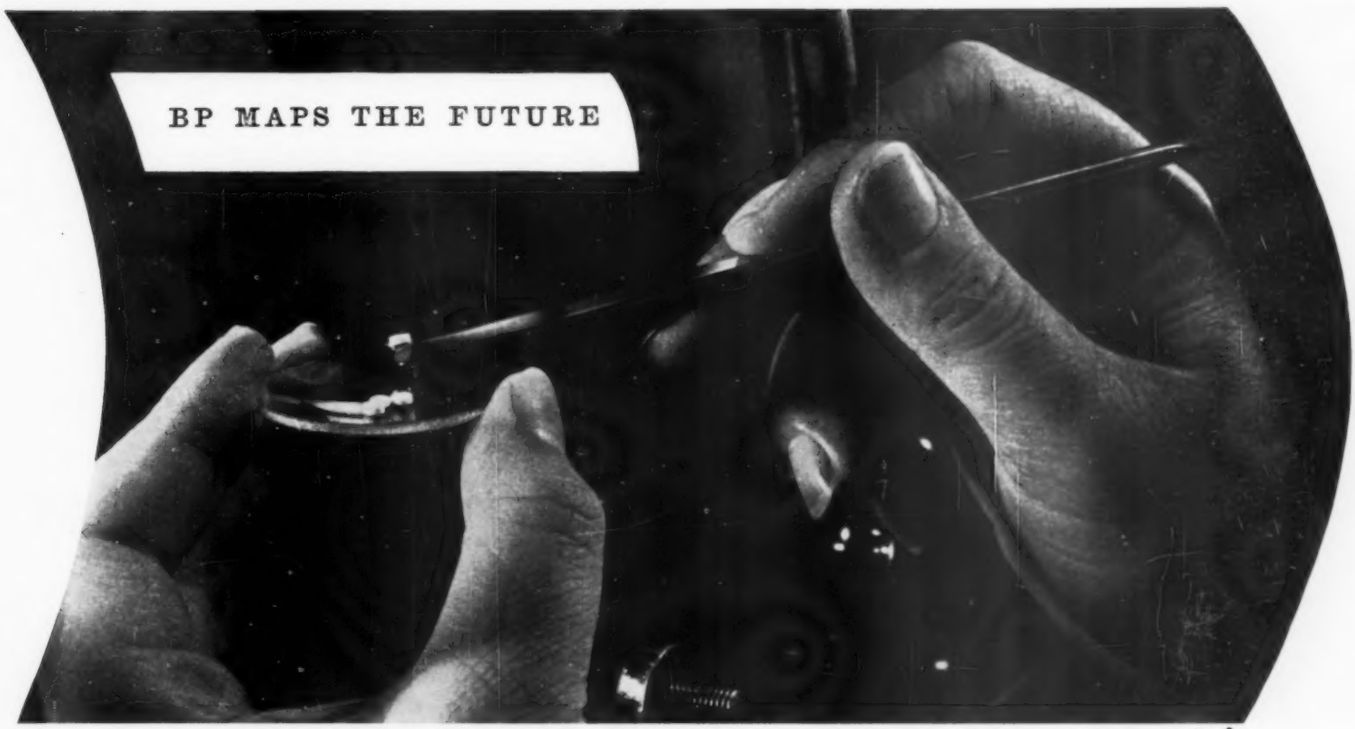
A native of Pittsburgh, Dr. Probst received his Ph.D. in petroleum geology at Northwestern University.

EMILE ERMUND SOUBRY, executive vice president of the Standard Oil Co. (N.J.), has joined the board of the Foreign Policy Assn. Worldwide marketing problems have long been Mr. Soubry's chief business interests. A native of England, he began his career in 1911 with the Anglo-American Oil Co., serving ultimately as managing director and board chairman. He became foreign marketing coordinator for Standard Oil in 1943—and, successively, director, vice president, and executive committee-member. In April of this year he was named executive vice president.

GORDON W. DUNCAN, assistant director, technical information division, Esso Research and Engineering Co., has accepted an appointment for one year as assistant general secretary of the Fifth World Petroleum Congress. Mr. Duncan has been with Esso Research and Engineering for 21 years. The Fifth World Petroleum Congress is scheduled to be held in New York's Coliseum next year from May 30 to June 5.

G. W. Duncan

E. E. Soubry



A sample of catalyst for use in oil refining is about to be analysed in a spectrometer at the BP Research Station, Sunbury, England.

How will these hands shape tomorrow's motoring?

WHOSE HANDS ARE THESE! They are the hands of a chemist at the research station of The British Petroleum Company at Sunbury-on-Thames. One of nearly a thousand BP research workers whose main task is to conjure more and better products from one single substance – crude petroleum.

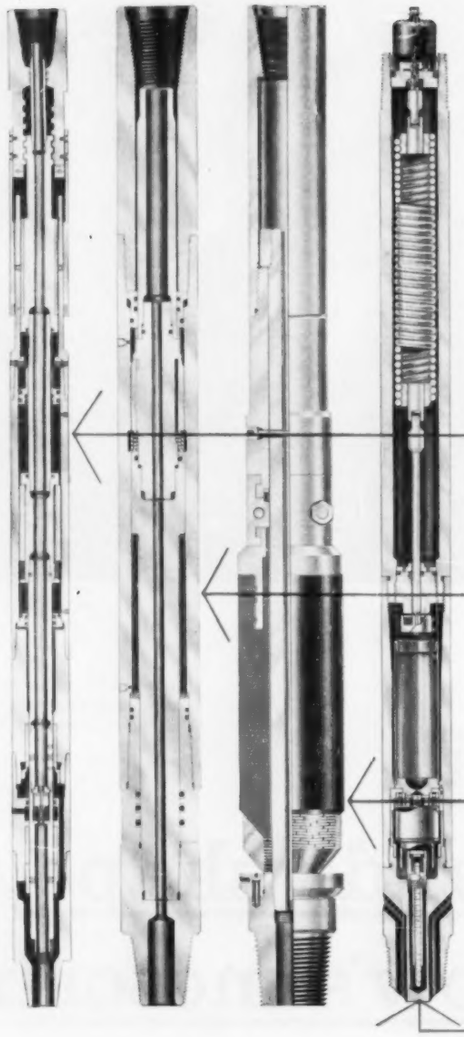
Among the many different users of oil products, no one has gained more than motorists and motor-cyclists from the work of these men and women. No one has more to gain in the future. To quote one example, BP Energol Visco-static, the all-weather motor oil which reduces engine wear by 80%, was a recent Sunbury triumph. The result of many months of patient research

In 1917, Sunbury Research Station began with one modest house. Now it occupies thirty-nine acres and is still expanding. Besides its laboratory and development work, Sunbury carries out the most exhaustive proving-tests of BP products and processes. The latest major addition to its resources is a motor fuels engine-test laboratory, where cars can be tested at speeds up to more than 100 m.p.h. under temperature and humidity conditions equivalent to the most extreme tropical climates.

Thus, constant research ensures the supreme quality of BP products, for use all over the world, and even more efficient fuels and oils for the engines of tomorrow. At Sunbury, the future takes shape today.

THE *British Petroleum* COMPANY LIMITED

BP



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The newest Johnston Jar, the Type HS-1 Hydraulic Jar, answered the needs dictated by drill stem testing operations. More jarring action from this "easy to maintain" tool. Shorter for "easier handling" and faster "make-up." Designed to consistently deliver and withstand innumerable shocking blows.

The Johnston Bob-Tail Packer. Its design features a reduction of the necessary rubber diameter while assuring a completely effective seal. The increased by-pass area improves running characteristics and speeds up running and pulling time. In washed-out or out-of-gauge holes a larger packer and packing element gives the same advantages.

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Johnston's thirty years of manufacturing and testing know-how is easily recognized in The Tool The Test Designed. Each piece of Johnston equipment is designed to meet the requirements of the test under all types of well conditions.

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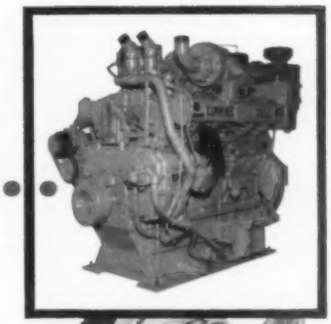
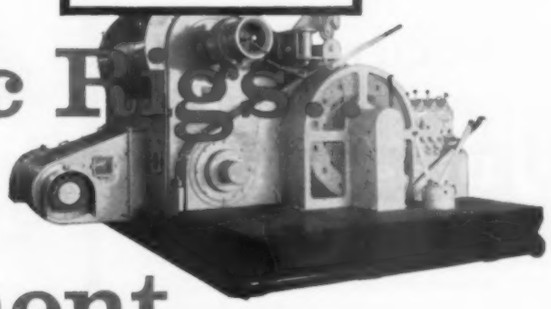


Electric Rigs



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THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

J. EARLE GRAY has been assigned to full-time duties as manager of foreign operations of Tidewater Oil Co., it has been announced by George F. Getty 2nd, Tidewater president. Until recently, Mr. Gray supervised foreign exploration and production operations in addition to his responsibilities as assistant general manager of the company's western division.

Tidewater's foreign oil exploration or production interests at present include Canada, Guatemala, Iran, Pakistan, Paraguay, and Turkey.

JOHN M. HOUCHIN, vice president and a director of Phillips Petroleum Co., Bartlesville, Okla., has been elected a member of the company's executive committee.

Mr. Houchin, who started with Phillips in the production department in Oklahoma City in 1933, advanced to chairman of the company's operating committee in February 1956, and to vice president a year later.

GEORGE M. SULLIVAN and **JAMES S. ROYDS**, both of Houston, have been elected administrative vice presidents of Continental Oil Co., Houston, Texas. Mr. Sullivan is general manager of marketing for Continental, while Mr. Royds is general manager of exploration, and each will continue to be responsible for these same functions.

A. J. FOOTE has been appointed manager, head office manufacturing—operations, for Shell Oil Co. of Canada Ltd. He previously had served as chief technologist at the company's Montreal refinery. Mr. Foote succeeds P. Gordon, recently named assistant manager of the company's Shellburn refinery at Vancouver.

DR. ARTURO SAVATO has been appointed deputy to President Frondizi in Yacimientos Petroliferos Fiscales (YPF). Dr. Savato is a chemist who has worked in the YPF laboratories at La Plata refinery and at Florencia Varela.

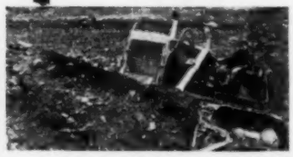
SPECIFY

ROLLS-ROYCE Diesels

The suitability of Rolls-Royce diesels for a wide variety of installations is proved by the fact that a dozen of the world's leading Oil Companies in South America, Trinidad, Iraq, Kuwait, and Borneo are placing orders for Rolls-Royce powered equipment. National Oweco and Woodfield Hoist Ideco are using Rolls-Royce diesels in work-over hoists, service drilling rigs and slush pumps. On Lake Maracaibo Shell are operating over seventy Rolls-Royce diesels in high speed launches and workboats, in addition to a large number in Coles Cranes, Consolidated Pneumatic Compressors, Scammell Trucks and Petbow Generators.

Scammell Constructor

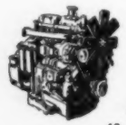
Woodfield Hoist "Fieldmaster"

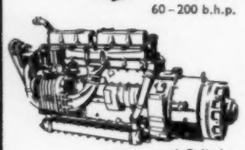

International BTD 20

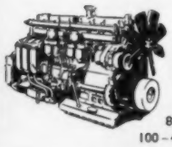
Shell Personnel Launch

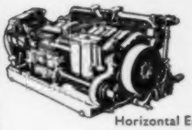
Coles Crane

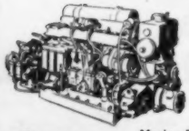
National Oweco Drilling Rig

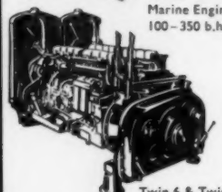

4 Cylinder
60 – 200 b.h.p.


6 Cylinder
with Torque Converter
80 – 300 b.h.p.


8 Cylinder
100 – 400 b.h.p.


Horizontal Engines
100 – 400 b.h.p.


Marine Engines
100 – 350 b.h.p.


Twin 6 & Twin 8
Power Packs up to 600 b.h.p.

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CARL M. DECKARD, controller of the Oasis Oil Co. of Libya, located in Tripoli, a wholly owned subsidiary of The Ohio Oil Co., has been appointed general auditor in the auditing division of Ohio Oil, at Findlay, Ohio. Lewis J. Qualkenbush will replace Mr. Deckard in Tripoli.

HUGH INGERSOL McMICHAEL has been appointed commodore of BP Tanker Co. Ltd. (the main shipping organization of The British Petroleum Co. Ltd.) succeeding Commodore S. D. Bumstead, retired after 37 years' service with the company.

Captain McMichael began his seagoing career in 1920, and has been in command of super tankers since 1955, his present ship being the 32,000 dwt "British Courage."

HAROLD T. BYCK has been named assistant to the vice president of Shell Development Co.'s exploration and production research division, in Houston, Texas. He had been technical assistant to the president of the company in New York since 1953, and joined Shell in 1936 as a research chemist at the company's Emeryville, Calif., research center.

J. D. WELLS has been named chief production engineer, and **C. CLARK FULLER, Jr.**, staff engineer for Pan American International Oil Co. They will be assigned to the firm's New York office. Both men have been on the Tulsa engineering staff of Pan American Petroleum Corp., parent company for Pan American International.

DONALD M. COX has been appointed general manager of Esso Standard Oil Co.'s supply department—succeeding George T. Piercy, who becomes assistant manager of the coordination and petroleum economics department of Standard Oil Co. (N.J.), Esso's parent company.

HARRY D. L'HEUREX, only employee whose working life has spanned entire history of General Petroleum Corp., has retired after 47 years' service. He had been manager of the company's building department. He started at age 18 with Esperanza Consolidated Oil Co., in San Francisco, forerunner of General Petroleum. He is the last man among General Petroleum's more than 6,500 employees to have worked with both companies.

DEAN ANDERSON McGEE, of Kerr-McGee Oil Industries Inc., Oklahoma City, and **ERWIN W. PAULEY**, president of Fortuna Petroleum Corp., Los Angeles, have been elected (among others) to membership on the 150-man board of trustees of the Committee for Economic Development, New York.

T. KEITH GLENNAN, president of Case Inst. of Technology, Cleveland; **RICHARD C. SAUER**, vice president supply and distribution of Sohio, Cleveland; and **SIDNEY A. SWENSRUD**, former board chairman for Gulf Oil Corp., and earlier Sohio's executive vice president, have been elected directors of The Standard Oil Co. (Ohio), Cleveland, Ohio.

A. DENYS CADMAN, formerly employee-relations manager of British American Oil, has been appointed executive representative for the Gulf Oil Corp.—with headquarters in New York, N. Y. A native of Birmingham, England, he entered the oil industry in 1930. He joined B-A in 1945, and was appointed employee-relations manager in 1952.

Refinery Executive Dies

W. B. Hart, retired refinery executive of The Atlantic Refining Co., died, April 24. He was 67. Formerly superintendent of services at Atlantic's Philadelphia refinery before his retirement in 1956, Mr. Hart was widely known for his work in the fields of industrial waste disposal and control of air pollution.

Shell Executive Dies

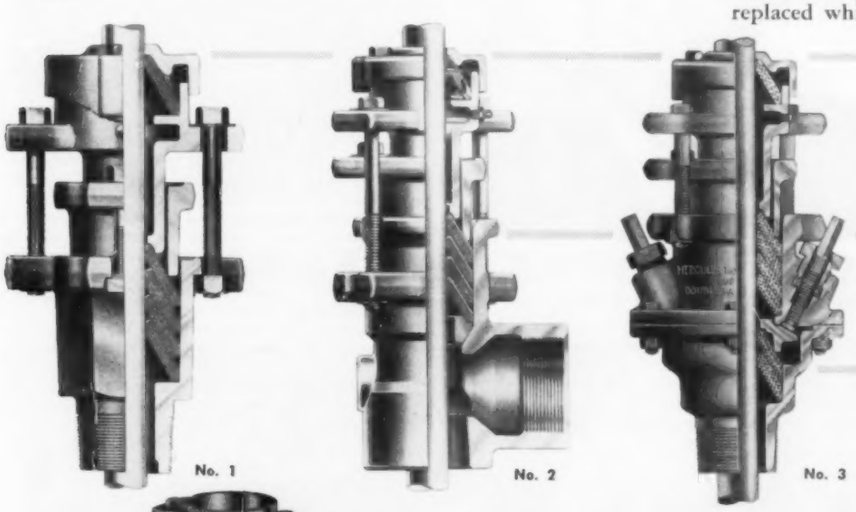
P. L. Tremblay, eastern division manager of Shell Oil Co. of Canada Ltd., died April 29. He was 49. He had established a marketing organization for the sale of chemical products in Paris before his appointment to his most recent position.

HAVE EXPERIENCE — WILL TRAVEL

Hercules oil field production equipment was first used in Kansas and Oklahoma oil fields. From this area, because of its consistent quality and rugged construction, its use spread first over all of the fields in the United States and Canada. Now its popularity has spread around the globe and you will find Hercules products available through supply houses everywhere.

Hercules Duplex Polished Rod Stuffing Boxes are available in three styles:

1. "Regular Type" — Has male thread to screw into Pumping Tee.
2. "Tee- Type" — A combination Tee and Stuffing Box. Has female thread to screw directly onto tubing.
3. "Type DP" — Double Packed for use on high pressure or intermittently flowing wells. Allows Main Packing to be replaced while pressure is on well.



HERCULES "REGULAR TYPE" DUPLEX STUFFING BOX

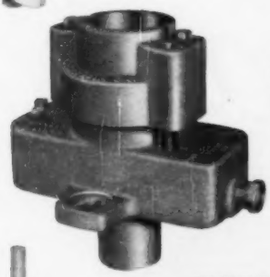
More efficient operation with fine adjustment possible. Offers longer packing life due to ability of Packing and Glands to follow lateral movement of Polished Rod. Malleable iron construction prevents breakage if rods are accidentally dropped on Stuffing Box.

HERCULES "TEE TYPE" Duplex Stuffing Box

Very compact as it is approximately only 15" high. Eliminates one threaded connection between Stuffing Box and Tee. Full opening — allows Rods to be run or pulled without removing Stuffing Box body.

HERCULES "TYPE DP" (Double Packed) DUPLEX STUFFING BOX

Designed for use on high pressure or intermittently flowing wells. Allows Main Packing to be easily changed by turning the two compression bolts until lower Packing packs-off. The Upper Packing can then be removed and replaced.



HERCULES OIL RESERVOIR UPPER GLAND

Any Hercules Stuffing Boxes may be equipped with Oil Reservoir Upper Gland on "problem" wells which pump-off and burn packing. The polished rod moves through the oil in the reservoir which lubricates and cools it.

HERCULES POLISHED ROD CLAMP-OFF SUPPORT

For use with all Hercules Stuffing Boxes (except "DP TYPE" Box). Manufactured from Hi-Tensile aluminum alloy, weighing only 20 pounds. These supports offer maximum safety with minimum weight. Easily handled and installed by one man. Prevent accidents and personal injuries, while clamping-off, by using Hercules Clamp-Off Supports.

Write for complete information on any Hercules product, without obligation.

HERCULES CONE-SHAPED PACKING RINGS

Hercules Split Cone packing rings come in three grades: SOFT rings are used always with bronze liners or with steel polished rods in wells which are not always pumping fluid. HARD Rings are used and recommended for steel polished rods only, and where fluid is constantly being pumped. LUBRICATED Rings are recommended for problem wells which pump-off persistently. When well is pumped dry, the rings lubricate the polished rod and prevent the packing from burning until fluid is again present.

HERCULES SPLIT CONE PACKING RINGS are packed in sets of four in each of three grades: SOFT, HARD and LUBRICATED.

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President Guy J. Coffey, of Chicago Pneumatic Tool Co., and President Ken W. Davis, of Harrisburg Sales & Service, Inc., who recently announced the formation of CP-Harrisburg Inc.

CP-Harrisburg Inc., Worldwide

Guy J. Coffey, president of Chicago Pneumatic Tool Co., of New York, has announced formation of a marketing and distribution arrangement with Ken W. Davis, of Fort Worth, Texas, president of Harrisburg Sales & Service Inc.

Worldwide marketing and distribution of Chicago Pneumatic oil-field products will now be handled by a new Texas corporation formed by Ken W. Davis, of Fort Worth, called CP-Harrisburg Inc. The new company is not a subsidiary of Chicago Pneumatic Tool Co. nor of Mid-Continent Supply Co., of which Mr. Davis is also president.

This marketing arrangement combines two well-known names in the oil industry. Chicago Pneumatic has manufactured drilling bits and other oil-field equipment for over 28 years, and has been an honored name in American industry for 57 years. Harrisburg Sales & Service Inc. has been supplying the oil industry with "Diamond Hard" products through authorized supply companies since 1930.

Ken W. Davis, president of the newly formed company, pointed out that CP-Harrisburg Inc. will operate independently to promote worldwide sales of these products with a greatly accelerated marketing and distribution setup through authorized oil-field supply houses.

W. F. Burrows

White Promotes Three

The White Motor Co. board of directors has elected Z. C. R. Hensen, president of the Diamond T Motor Truck Co., a director of The White Co. He was also named executive vice president and general manager of the Diamond T Division. J. P. Dragin, vice president-finance, was named executive vice president-Finance and Administration. He is a director of the company. He has been with White since 1945 and vice president since 1956. William F. Burrows, general manager of the White Diesel Engine Division, Springfield, Ohio, was appointed vice president and general manager—Diesel Engine Division.

Oilfield Equipment New Offices

T. E. Ward, Jr., president of Oilfield Equipment Co., has announced company has moved to 90 West St., New York. Previously the company had been at 30 Church St. Founded in 1923 by the Elder Ward, Oilfield Equipment represents Hercules Tool Co. products.

Wilmington Seeks Refinery

Factors which influence the location of an oil refinery were explained to the Committee of 100 of the Greater Wilmington, Del., Industrial Development Committee in an address by Harvey W. Blankenship, director of public relations for Universal Oil Products Co. He was invited to a meeting, April 30, as part of the committee's plan to influence some oil company to enter the area with a modern plant.

Five considerations were listed as influencing a decision: (1) attitude of the community to be served; (2) sources of raw material; (3) markets for products; (4) availability of adequate finances; and (5) availability of skilled and unskilled labor.

Mr. Blankenship suggested to the committee that its members prepare a detailed brochure showing availability of sites, legal restrictions, taxes, and other data for presentation to oil companies, and that the brochure then should be followed by personal calls on oil executives.

To illustrate the importance of a refinery to a community, Mr. Blankenship said that a modern 50,000 b/d plant costing $60 million to $80 million will require two years to build, and need 1,000 to 1,500 men during construction and a permanent force of 350 to 400 after completion.

new efficiency and corrosion resistance in . . .

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and WATER FLOODING

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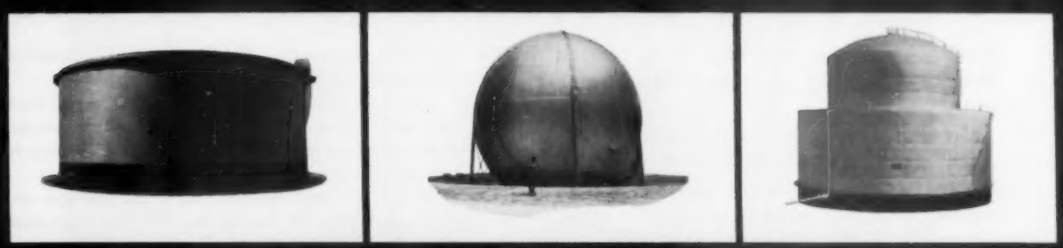
★ INCLUDING THE WELL-KNOWN HAMMOND TUBESEAL.



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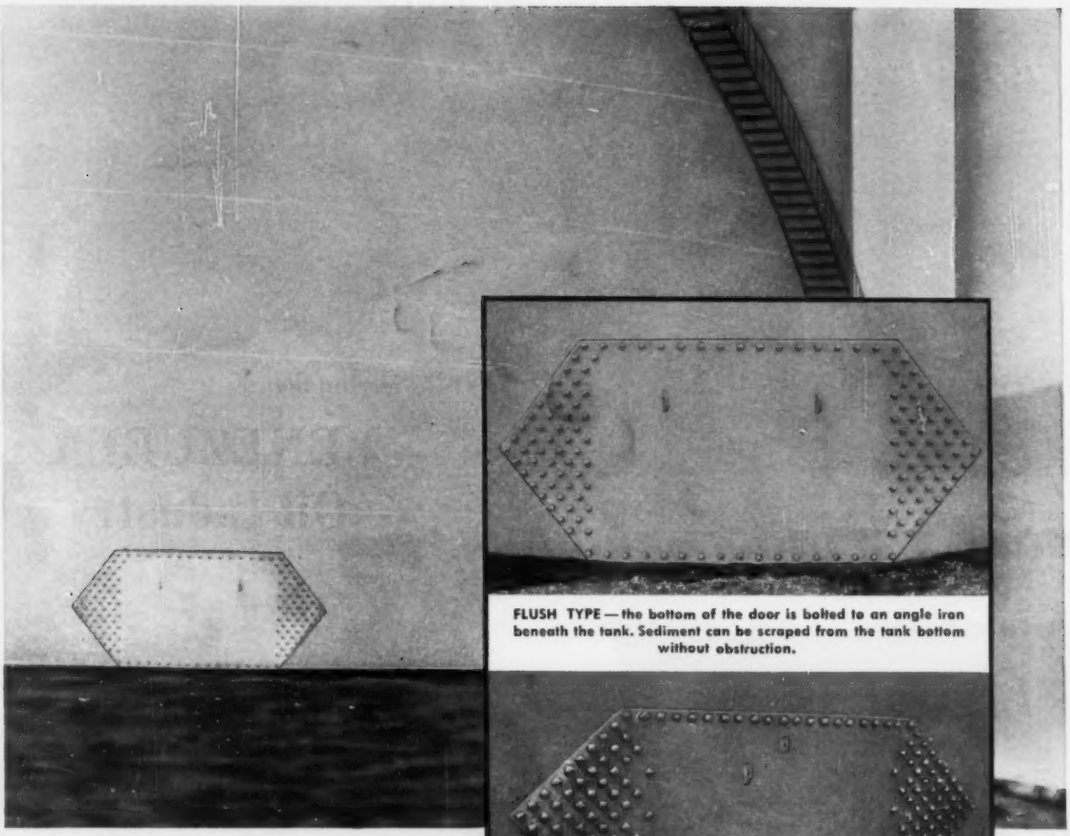
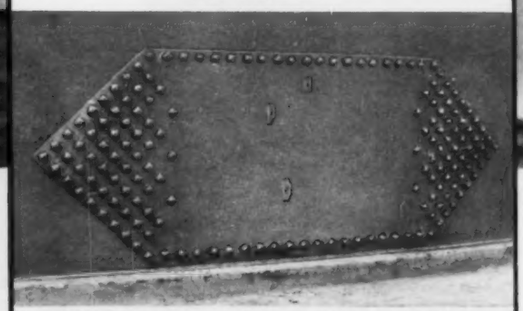


FLUSH TYPE — the bottom of the door is bolted to an angle iron beneath the tank. Sediment can be scraped from the tank bottom without obstruction.



RAISED TYPE — the bottom of the door is bolted to a strip remaining on the supporting plate — similar to the mounting method for conventional riveted doors.

COST-SAVING NEWS FOR USERS OF LARGE TANKS

Two New Bolted Clean-out Doors

Removing sediment from large tanks through riveted doors or small bolted manways is a time-consuming and costly procedure.

Graver has developed a solution that speeds clean-out —the two new large bolted doors illustrated above. Mounted at ground level, the doors can be removed and replaced by regular maintenance crews. Sealing is simple and leakproof. The openings provide ample clearance for clean-out equipment. The doors can be installed in the shop or in the field during tank erection.

Although several features are believed to be unique, Graver has made the designs available to industry without restriction as another contribution toward reducing operating costs.

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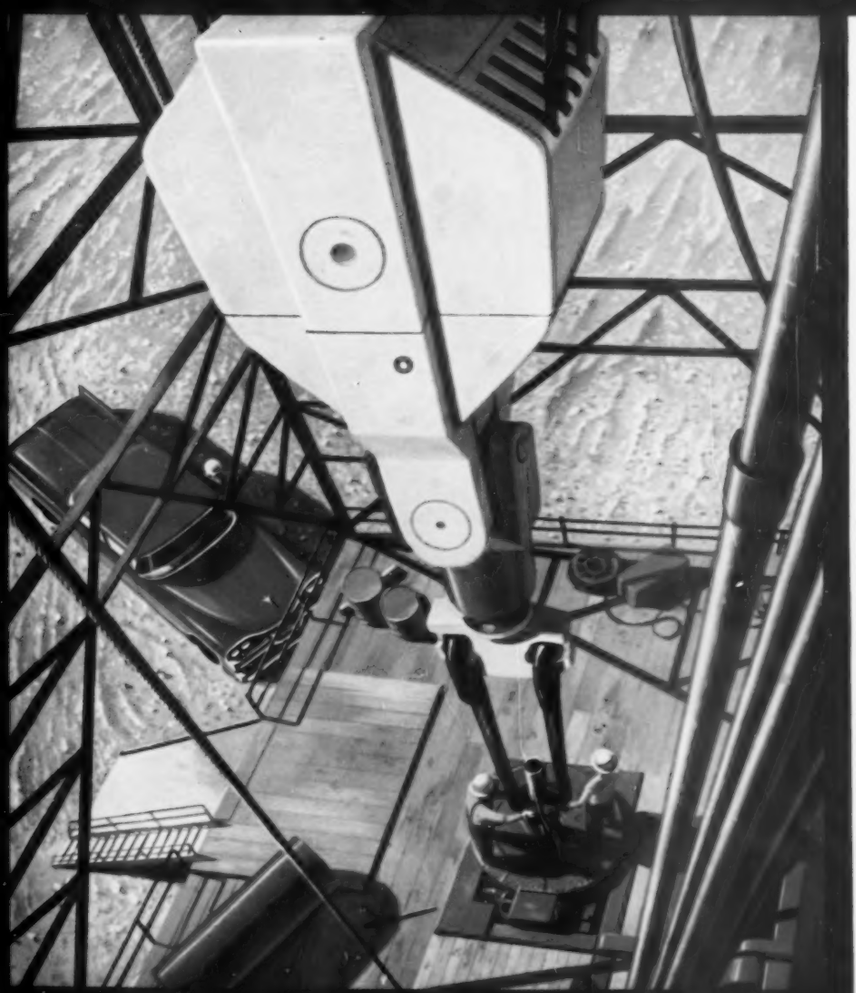

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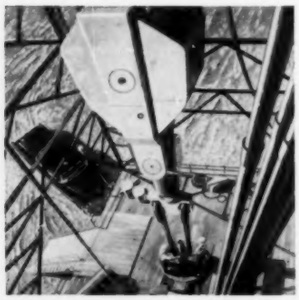

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NITROGEN: Nitrogen products including ammonia, urea, sodium nitrate and fertilizers; petro-chemicals including ethylene glycol, ethanolamines and methanol.

SEMET-SOLVAY: Coke, coke ovens; "A-C" low mol. wt. polyethylene.

SOLVAY PROCESS: Alkalies; chloromethanes, hydrogen peroxide, aluminum chloride; "MUTUAL" chrome chemicals.

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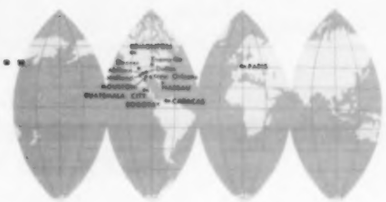

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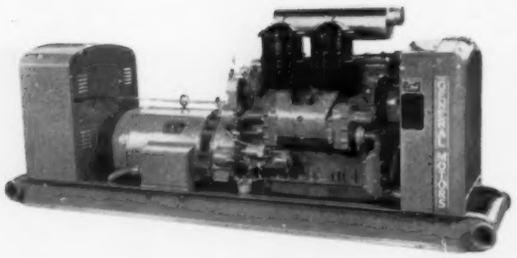
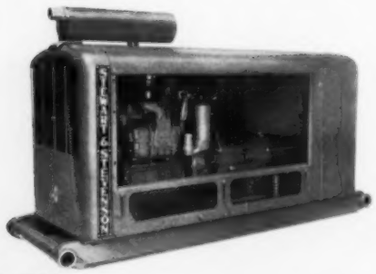


OPEN TYPE



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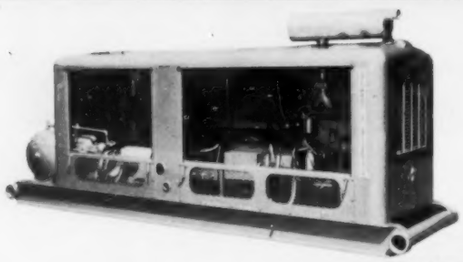

UTILITY UNIT

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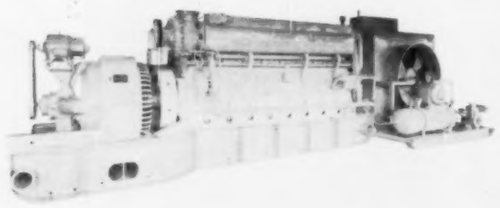
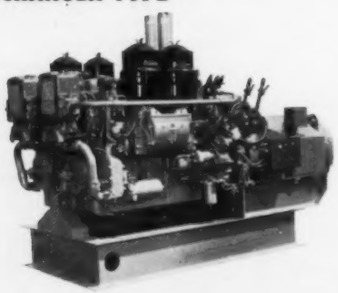


HEAT EXCHANGER TYPE



In 1836, Baron Berzelius looked to the Greeks for a word to describe the phenomenon whereby certain substances, merely by their presence, alter the rate of chemical reactions. He chose 'catalysis' from the Greek for 'down' (kata) and 'to loosen' (lyein) —the implication being that a catalyst alters the rate of reaction by loosening or breaking down the bonds of the reactant molecules.

In modern industry, many chemical processes are accelerated by catalysts. And in the heavy chemical, petroleum chemical, and petroleum refining industries, the I.C.I. range of catalysts is well known and widely used.

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Major Refinery Increases in Venezuela

(Continued from page 83)

concurrent increases in the products-handling and utilities facilities. New tanks and LPG spheres are appearing like mushrooms; and a fourth finger pier, which will provide two additional berths for supertankers, is under construction. The steam needed for process requirements is partly produced in waste-heat boilers installed on the units, and partly by a battery of six medium-pressure steam boilers. The total capacity of these boilers is 750,000 lb of steam per hour at a pressure of 250 psig, and superheated to a temperature of 650 F. The electricity-generating plant consists of six condensing turbo-alternator sets with a total capacity of 55,000 kw—the associated steam-raising plant being composed of five high-pressure boilers. Sea water is used for all process cooling-water requirements. Ten salt-water pumps, driven by either steam turbines or electric motors, pump salt water to the processing units through four 53-in. mains. The total installed pumping capacity amounts to 16 million US gallons per hour.

The process control and engine laboratories have been extended, and a total of 2,400 analyses are performed daily. About 4,000 people work at Cardón refinery. Of these, about 2,700 are mechanics, plant operators, etc.; and the rest, some 1,300, are office workers and technicians.

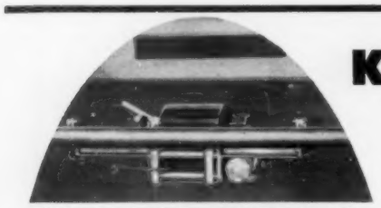
Richmond Exploration Co.: The Bajo Grande refinery of Richmond, an exceptionally modern and well designed plant, is being expanded sharply. At present the refinery consists of three distillation units: Unit No. 1 is primarily a topping unit with a nominal capacity of 15,000 b/d. Naphtha is recovered, which is used to cut back the penetration (solid) asphalts of unit No. 2 to produce the RC grade road oils (liquid asphalts). The residue from this unit is marketed as topped crude.

Unit No. 2 is a complete unit—producing naphtha; kerosine; No. 2, 4, and 6 fuel oils, as well as penetration (solid) asphalts. Nominal capacity is 10,000 b/d.

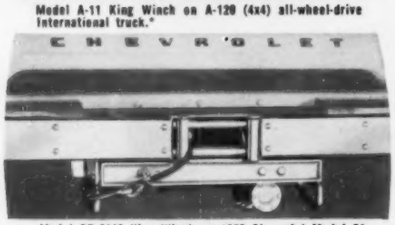
Unit No. 3 is a distillation unit intermediate between units No. 1 and 2; and was designed in such a manner that, with some slight changes and additions, it can be converted into a complete unit such as No. 2. At present it is used to produce naphtha, topped-crude, high-viscosity fuel oils, and slow-curing (liquid) asphalts SC-2, 3, and 4. Nominal capacity of this unit is 20,000 b/d.

Plans are to increase the capacity of the No. 2 unit to 15,000 b/d by the installation of additional heat exchangers and feed pumps; also to make the necessary additions to unit No. 3 so that it will produce solid (penetration) asphalts in addition to the other products mentioned. Capacity of No. 3 unit for the production of topped crude and heavy-viscosity fuel oils will then be approximately 23,000 b/d, and for solid asphalts about 8,500 b/d.

These additions will probably be completed during 1959. END

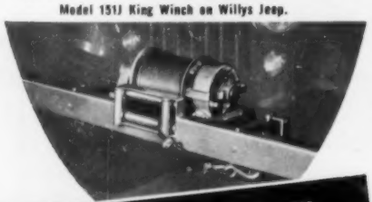


Model A-11 King Winch on A-120 (4x4) all-wheel-drive International truck.*



Model CD-811B King Winch on 1958 Chevrolet Model 31 (4x4).

Model 151J King Winch on Willys Jeep.



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* *King Winches for International trucks are available through International-Harvester dealers.*

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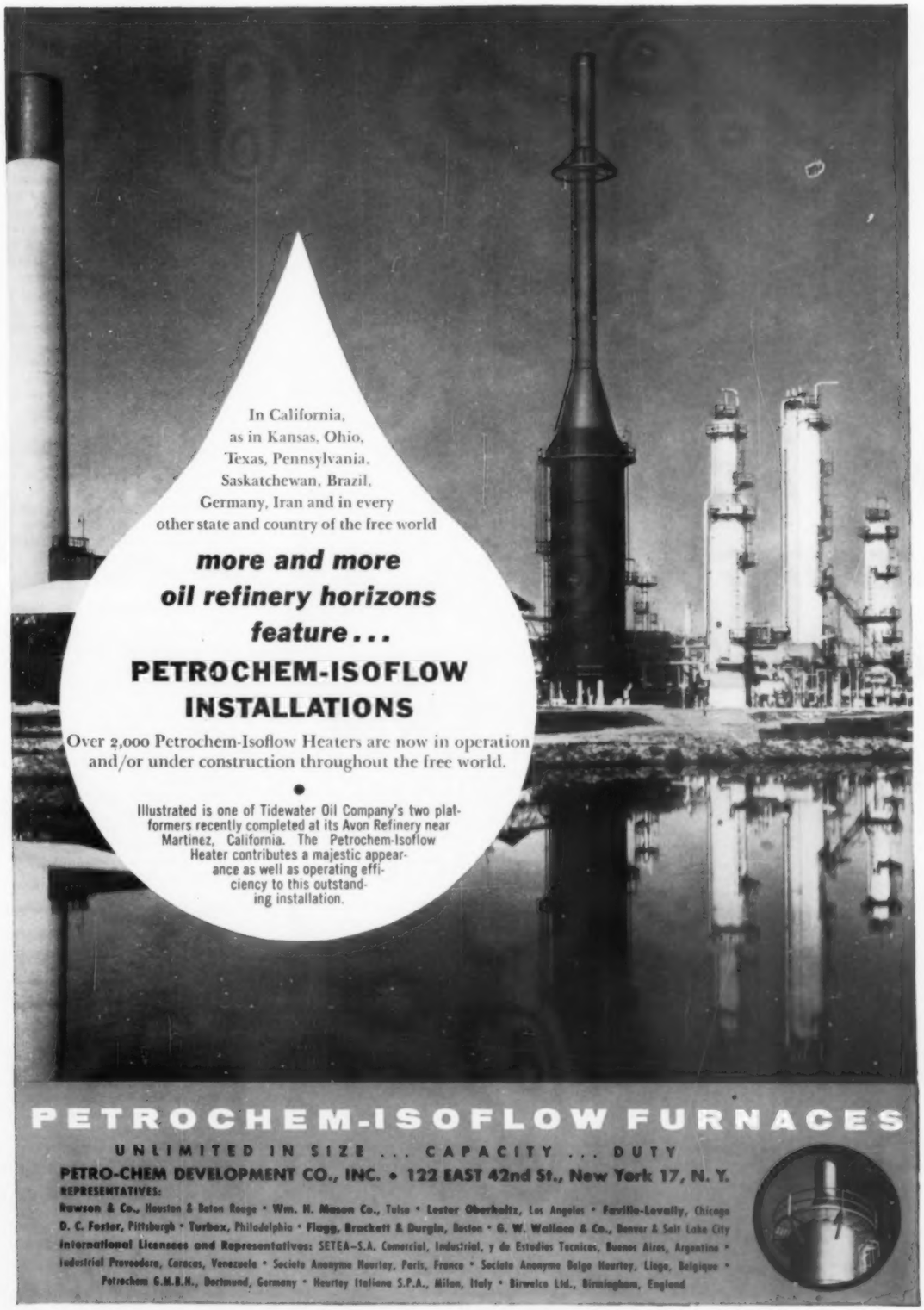
Aerobol New Helicopter Co.

Announcement has been made in Venezuela of the formation of Aeroservicios Bolivarianos, CA (AEROBOL), a company offering complete helicopter service in Venezuela and other countries. It is a Venezuelan corporation employing Venezuelan personnel with specialized American consultants. The activities of the company are guided primarily by the need of the client. Its available fleet now numbers five Hiller UH 12C helicopters. Personnel is experienced; Oscar Torres, chief pilot, has logged over 4,000 hours in helicopters, 3,500 of them in jungle terrain.

The company is under the direct supervision of A. Leslie Escoffery, Jr., a consulting engineer, well known in Peru and Bolivia and formerly resident in Lima. Key personnel of the new company were formerly in charge of the aviation activities of an associated company, Petromina CA, which during the past two years has been employing helicopter techniques for servicing as many as seven separate geological exploration parties in dense tropical jungle of Peru..

SONJ Stock Deal for International

Standard Oil Co. (New Jersey), in seeking full ownership of International Petroleum Co., large South American oil-producing and distribution firm, has registered 2.2 million additional shares of its capital stock with SEC to be offered in exchange for the shares of International—on the basis of nine shares of Jersey Standard for ten shares of International. SONJ already owns 83% of International's stock.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New Brazilian Pipelines

Petrobras estimates expenditure, 1957-61, at 1,917 million cruzeiros (US $16 million at present free rates) for construction of pipelines and terminals during the 5-year period. The Catu-Mata-Candeias pipeline in the Bahia Reconcavo (31.2 miles long, capacity 18,000 b/d) was inaugurated in 1957. In November of the same year, Petrobras completed another pipeline (39 miles long, capacity 60,000 b/d) to carry crude from the Catu, Pojuca-Central, Mata de Sao Joao, Candeias, Paramirim, and Dom Joao fields to the Madre de Deus ocean terminal.

A project has been submitted to the Minas Gerais legislative assembly, opening a credit of 200 million cruzeiros as initial contribution towards building a pipeline from Rio de Janeiro to Belo Horizonte, the state capital. Colonel Nuñes said recently the cost is estimated at 1,800 million cruzeiros; 200 million will suffice to start the work, but continuation will depend on provision of additional funds.

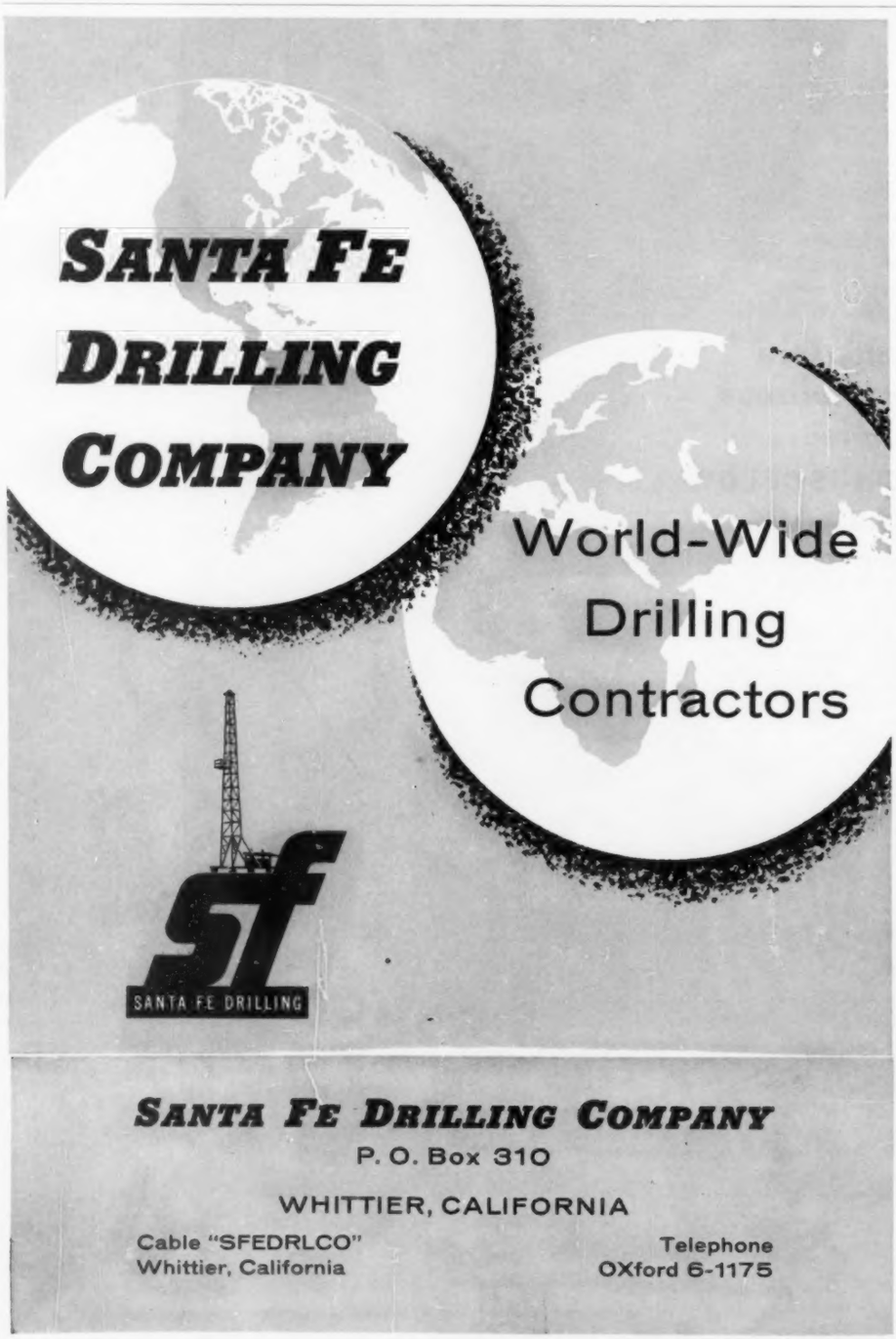
A project has been completed to build a short pipeline from the port of Arraial, in the municipality of Cabo Frio, state of Rio de Janeiro, to the government's caustic-soda and soda-ash factory in the same municipality.

Petrobras engineers are visiting Rio Grande do Sul in connection with plans to build a refinery in that state and lay a pipeline from Tramandai to Porto Alegre.

The Brazil-Bolivian agreement, signed in March, provides that Brazil will build a pipeline from Bolivia to the Atlantic port of Santos, estimated to cost US $120 million.

New USA-Venezuela Air Service

Soon to be inaugurated will be fastest air service between New Orleans, La., and Caracas-Maracaibo, Venezuela. Linea Aeropostal Venezolana (LAV)'s new nonstop 5½-hour service will link oil fields of Venezuela with USA Southwest. Super Constellations will fly three times a week in each direction.



Venezuela's Role

"Imports from Venezuela to the United States have had a counterpart from the United States to Venezuela, Dr. Eduardo A. Acosta, Minister Counselor of Petroleum Affairs of the Venezuelan Embassy, said at the recent annual meeting of the Texas Independent Producers and Royalty Assn.

"Trading between the two countries has been straightforward and fair. Trade, I would say, is good for both of us; the advantages have been mutual, and have resulted in a strengthening of the economic bonds between our two nations.

"However, although trading is strictly a business proposition, I should mention that Venezuela's attitude has not been purely that of a good merchant. Behind the serious faces of our hard-boiled negotiators there has been the flicker and twinkle of the flame of friendship, and I believe that Venezuela in this respect has proved to be a friend of the United States in times of bonanza and in times of emergency. To this end, it is to be remembered a gesture of Venezuela in 1950, at a time when oil imports into the United States were considered on the high side. This gesture was in the form of a communication sent by the then Minister of Development to top government officials of the state of Texas. This cablegram stated that Venezuela would subscribe to a gentlemen's agreement designed to relieve the tension that could exist in the American oil industry on account of oil imports. This is definite proof that Venezuela has been doing its very best to meet its friends halfway.

Texaco Cuban Drilling

The Texaco Petroleum Co. commenced drilling, April 23, 1958, in Las Villas province, Cuban, on concessions totaling approximately 600,000 hectares which are held with the Cuban Gulf Oil Co. Texaco Petroleum is a wholly owned subsidiary of The Texas Co. Cuban Gulf Oil is a wholly owned subsidiary of Gulf Oil Corp.

PGAC In Bolivia

Establishment of oil-field service operations in Bolivia has been announced by Perforating Guns Atlas Corp. Paul C. Charrin, PGAC president, said the new overseas activity is being started under contract with Yacimientos Petroliferes Fiscales Bolivianos, Bolivian government oil company. Headquarters will be at Camiri, and the company will serve the Bolivian oil fields which extend approximately 150 miles along the eastern side of the Andes mountains.

The company will also make its oil-field services available to private firms which include many major USA oil companies now active in Bolivia. PGAC also has major oil-field service operations in Canada, Venezuela, West Germany, and at 24 locations in USA oil fields.

Drilling Platforms for Maracaibo

As part of its general expansion program, Mene Grande Oil Co. (Gulf) has awarded large contract to Raymond-Brown & Root CA for construction of 50 concrete deep-water drilling platforms in Venezuela's central Lake Maracaibo. With work already started, production schedule is for one platform per week.

This contract brings to 159 the total number of offshore structures placed in Lake Maracaibo's deep water by R-B-R since Venezuela released new concessions in the lake two years ago; 25 platforms have already been built for Mene Grande under previous contracts.

YPF Board Resigns

The entire board of YPF, the Argentine government's oil monopoly, has resigned with the exception of Messrs. Catinari, De Vedia, Maristany, and Meira who will act as a separate advisory commission.

Brazilian Capital for Bolivia

Until August 12, Brazilian Bank for Economic Development will receive proposals from private enterprises, organized with Brazilian capital, who intend applying to the Bolivian government for concessions in area "B" of the zone referred to in the March 29, 1958 diplomatic notes between the two countries.

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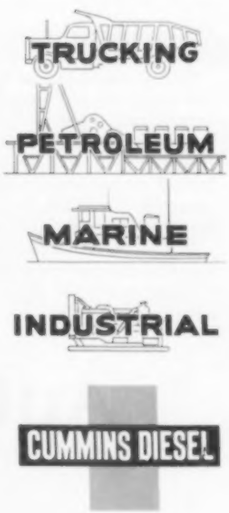

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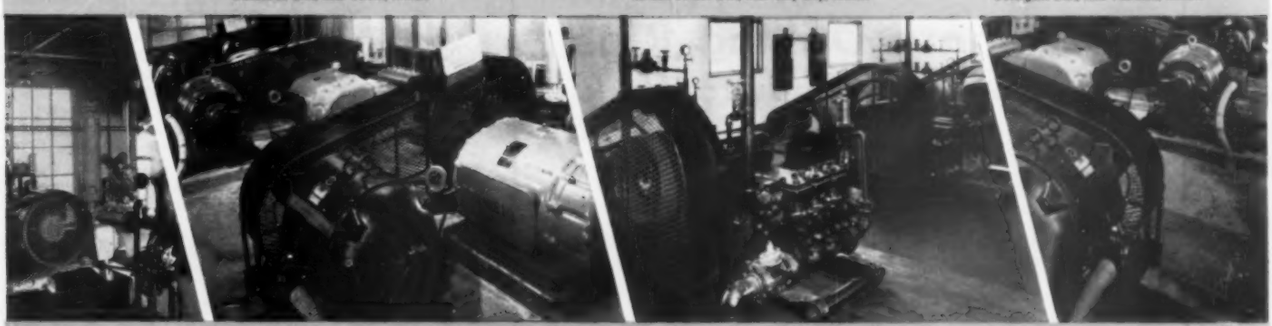

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Brazil's 1st Quarter Operations

Crude production, January 1 to April 25 (official figures), was 5,007,699 bbl (43,545 b/d). Rigs operating, 52.

Oil and gas shows were obtained in April from wildcat PL-1-BA, at Pau Lavrado, Bahia, between 4,114 ft and 4,150 ft. PL-1 is situated 5.1 miles outside the Agua Grande field, as previously delimited, and indicates an appreciable extension of the latter's producing area.

Petrobras has spudded wildcat R-1-PR, in the municipality of Reserva, state of Parana. In the Amazon basin, strategic wells are being drilled at Xu-st-1-PA on the Xingu River, in Para, and CS-st-1-AZ, at Codajos; wildcat Fa-1-AZ is being drilled at Faro. Drilling was suspended at PE-st-1-SP, Presidente Epitacio, Sao Paulo, to replace Cardwell OC rig by one of higher capacity, after reaching 9,587 ft. PG-1-SP at Pitanga, municipality of Piracicaba, Sao Paulo, was abandoned dry at 3,991 ft, having reached the crystalline layer.

Companhia Petroquimica Brasileira is now receiving regular supplies of aromatic residue from the Presidente Bernardes refinery to manufacture carbon black.

Vazquez Sonj Coordinator

Dr. Siro Vásquez, of Caracas, Venezuela, has been appointed coordinator of the producing coordination department of Standard Oil Co. (New Jersey) —responsible for coordinating the production activities of SONJ affiliates throughout the world.

Dr. Vázquez, who has been a director of Creole Petroleum Corp., was named to succeed M. A. Wright, elected to Jersey's board, May 28. Dr. Vázquez's appointment is consistent with Jersey's general practice of filling executive posts from within, but marks the first time the position of producing coordinator has been held by a Venezuelan.

Graduated in civil engineering by the Central University of Venezuela, in 1930, Dr. Vázquez studied petroleum engineering at the University of Tulsa in 1933, and in 1951 attended an advanced management course at Harvard. Before joining Creole in 1937, he had been for four years a petroleum inspector of the Venezuelan government. With Creole for 21 years, Dr. Vázquez was elected to the Creole board in 1953.

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Tenders complete with air conditioned living quarters and galley, distillation units, anchor winches, cranes, generator units, liquid and dry mud storage, water and fuel storage, etc.

Two complete units consist of Emsco J-1250 drawworks, powered by two General Motors Quads and all necessary platform equipment, companion tender units consist of two 600 HP mud pumps powered by two General Motors Quads.

One complete self-contained off-shore platform unit consisting of a National 55 drawworks, powered by two Superior PTDS-6 engines and torque converters. Jackknife derrick, two 600 HP Pumps, and all necessary auxiliary equipment for off-shore operations.

Also available are complete land rigs, capable of immediate service, with internal combustion gas power, or steam power.

If interested, address inquiries to Box 150, World Petroleum, 604 Fifth Ave., New York 20, N.Y.

90,000 B/D Refinery in Brazil

Foster Wheeler Corp. has signed a contract with Petroleo Brasileiro SA (Petrobras) for the new Duque le Caxias refinery near Rio de Janeiro, Brazil. The contract, which is expected to exceed $40 million, will comprise a complete 90,000 b/d refinery —including crude distillation, catalytic cracking, catalytic reforming, propane decarmonization and treating processes, steam and power generating equipment, tankage and other off-site facilities. Completion of the contract will require over two years. It is one of the largest single industrial contracts ever awarded in Brazil.

Cook Appointed by Smith Oil Tool

Arthur S. Marshall, vice president—Sales, H. C. Smith Oil Tool Co., has announced appointment of L. G. Cook as sales and service representative for the company in Venezuela. He will headquarter in Maracaibo. For the past year and half, Mr. Cook has been associated with the sales organization of Petro-Tech. CA, in Venezuela. Prior to that, he was active in sales and service of oil-field equipment in Texas and Louisiana for over 10 years.

Ken Forms Venezuela Firm

Ken Corp., Los Angeles, has organized Ken de Venezuela, CA, which will maintain service engineers at Anaco and Maracaibo for drilling and completion fluids and specialty oil tools. Wally McDivitt manages the eastern division at Anaco, and Bud Walden is manager of the western division at Maracaibo.

Mr. McDivitt was formerly superintendent of Ken's coastal district. He has been in Venezuela since January. Mr. Walden was previously a service engineer for Ken Corp., and has been in Venezuela for the past three years working with Peticon.

Creole Scholarships

A total of $36,700 in collateral grants to USA institutions of higher education has been announced in a joint statement by Creole Petroleum Corp. and the Creole Foundation. The grants, in sums ranging from $500 to $3,000, are being made to a total of 34 USA universities and colleges where Creole and Foundation scholarship students from Venezuela are currently enrolled.

Creole Foundation is a nonprofit organization, established in 1956 by Creole Petroleum Corp., for support and encouragement of educational, cultural, and scientific activities. While primary focus is on the Venezuelan community, some of its programs involve related activities abroad, particularly in the USA. Creole operates only in Venezuela, where it has 16,000 employees, over 90% of whom are Venezuelans.

Russians at 5th World Oil Congress

Top-ranking pertoleum scientists and technologists from Russia and other Soviet bloc areas will attend the Fifth World Petroleum Congress to be held in the USA next year. They will be among some 6,000 oil scientists from 47 countries who will attend this congress in the city of New York's Coliseum, May 30 to June 5, 1959. The number of Soviet experts who will make up the delegation has not yet been announced, but a group of 13 attended the last congress in Rome in 1955. At that meeting, the Russians revealed details of an important new development in oil-well drilling equipment, the "turbodrill," which is today being manufactured in the USA.

The World Petroleum Congress brings oil scientists together every four years to discuss and evaluate technical advances made in the petroleum industry. They present scientific data on all phases of the oil industry which have been documented in laboratories and petroleum installations all over the world. The congress in New York next year will be the first one held in this country.

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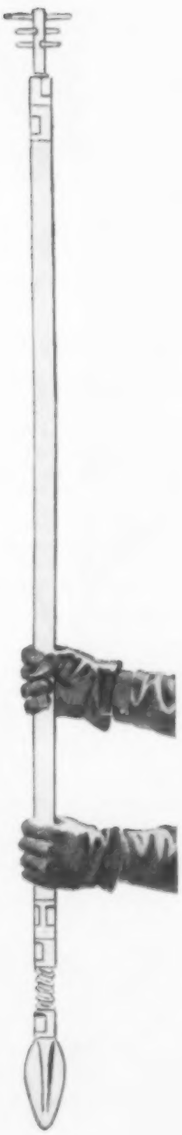

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HENRY E. WINTER has been appointed executive representative in Venezuela of International Petroleum Co. Ltd.—with headquarters in Caracas. He succeeds Edmund C. Breene, Jr., who is retiring after 24 years of service with International and other SONJ affiliates. Mr. Winter has had more than 20 years' experience in virtually all phases of the oil industry in Latin America. In 1935, after graduation from University of Nebraska with a degree in chemical engineering, he was employed by Lago Oil & Transport Co. Ltd., in Aruba, NWI. In 1939 he transferred to Venezuela, and spent the next 15 years with Creole Petroleum Corp. in various assignments. In 1954 he joined Jersey Standard's producing coordination department, in New York, as regional coordinator for Latin America. He transferred to International's executive office in Coral Gables, Fla., in November 1956, and since then has occupied the position of Venezuelan coordinator.

Aruba Refinery Runs Drop

Lago Oil and Transport Co. Ltd. (owned by SONJ) reports crude runs of 420,319 b/d during 1957 at its Aruba refinery—a drop of 6.84% from 451,166 b/d in 1956. Product shipments were 388,831 b/d in 1957—a drop of 8.95%.

Shipments do not include local sales, ship bunkers, or process fuel.

Washington 29th Compact State

The state of Washington became a full member of the Interstate Oil Compact Commission when Albert D. Rosellini, governor of the state of Washington, affixed his signature to the Compact Agreement on May 9, 1958. Washington formerly had been an associate member of the commission, but, with the discovery of oil in that state, became eligible to become a regular member.

The Interstate Oil Compact Commission now consists of 29 member states and two associate member states. An associate member is a state having prospects for oil or gas, but not yet having production.

Shown at the opening of Cameron's new Odessa plant are (left) Bill Osborn, Osborn-Miller-and-Thompson, Midland, Texas; and Roy Davis, sales manager, Cameron Iron Works, Houston, Texas.

New Cameron Plant

Cameron Iron Works Inc. recently entertained several thousand members of the oil drilling and producing industry at the "Big Blowout" opening of their new Odessa, Texas, plant.

Highlights of the opening included demonstrating the company's new, small, light-weight high-pressure blowout preventer—the first 7-in. 15,000 psi working pressure preventer ever made—and a new gate valve for working pressures to 15,000 psi.

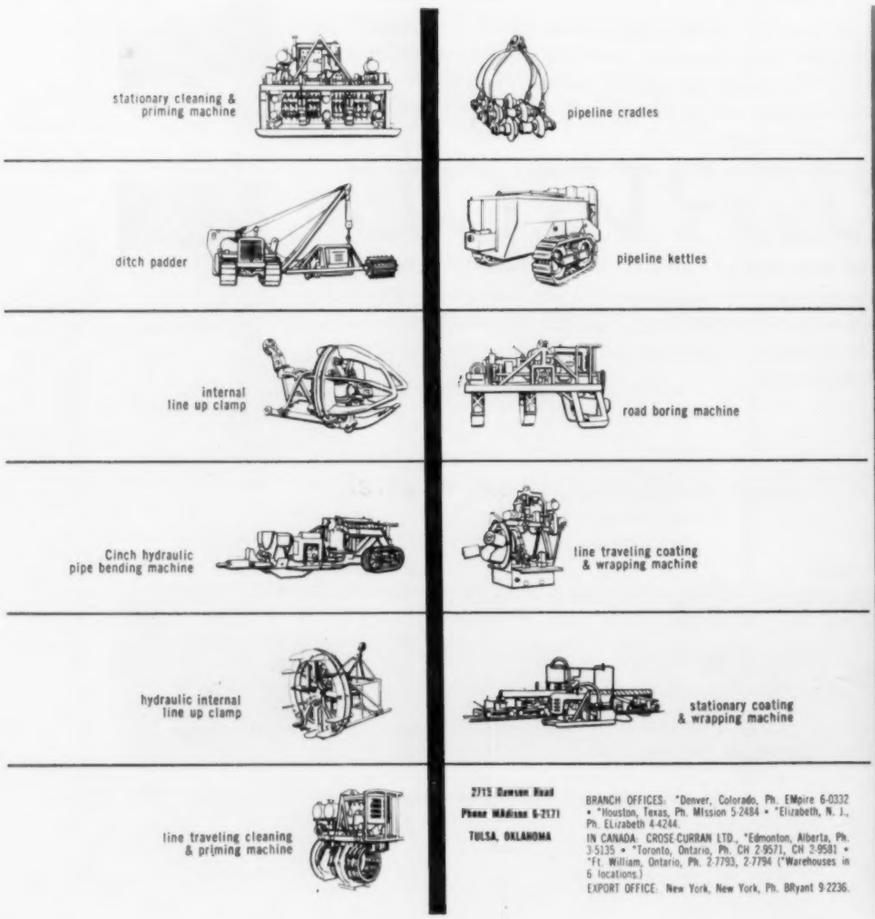
The new gate valve introduced a new principle of rotating the sealing surfaces slightly each time the valve was opened. This action distributes the wear on these surfaces, and gives considerable added life to the valve.

$450 Million To Suppliers

Socony Mobil Oil Co. Inc. will pay out approximately $450 million during 1958 to 30,000 companies

Ambassadors from more than 50 oil-producing countries have been extended invitations for their country to send official delegates to the May 14-23, 1959, International Petroleum Exposition in Tulsa, according to president W. K. Warren. Here Dr. O. B. Irizarry, Spanish speaking member of the IPE board, presents invitation to Brazilian Ambassador Ernani do Amaral Peixoto, on a recent trip to Washington. "We expect attendance from other countries to triple at the 1959 IPE," said president Warren.

for all the goods and services needed to run its business. This is just about the same as last year's expenditures, Albert L. Nickerson, president of the company, has revealed in the June issue of *Coronet* magazine. In an article entitled "How Big Business Hatches Small Business," he points out that the vast majority of small suppliers from whom Socony Mobil will make its 1958 purchases employ less than 20 people. "Although businesses like these are not invulnerable to failure," the author says, "their place in our economy is assured so long as they can do so many things cheaper and more efficiently than big business."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World Congress Treasurer

P. C. Spencer, board chairman for Sinclair Oil Corp., New York, has been appointed treasurer of the Fifth World Petroleum Congress—succeeding B. Brewster Jennings, who relinquished the appointment on his retirement from Socony Mobil Oil Co., of which he was chairman.

The Fifth World Petroleum Congress Inc. is organizing a six-day international meeting of petroleum scientists which is convening in New York on May 30 next year.

Revised Petroleum Standard

Latest revision of ASA Standard No. D288-57, "Standard Definitions of Terms Relating to Petroleum," has been published by American Standards Assn. 70 East 45th St., New York. Approved as *ASA No. Z11.28-1957*, present revision is 8th since the standard first was adopted in 1939. Among the 27 terms defined in the standard are asphalt, crude petroleum, fuel oil, kerosine, and tops. Copies may be obtained from the Am. Standards Assn., or from Am. Socy for Testing Materials, 1916 Race St., Philadelphia 3, Pa., at 30 cents per copy.

First LPGas Tariffs

For the first time a common carrier pipeline will soon be carrying LP-Gases from Gulf Coast refining centers to the Midwest. Texas Eastern Transmission Corp., Shreveport, La., is the carrier through the reconverted Little Big Inch pipeline. It will cost 54¢ to ship a barrel of LP-Gas from Beaumont, Texas, to Todhunter Terminal, in Ohio. It will cost 56¢ a barrel for shipments from Baytown, Texas, to Todhunter.

Fire-Protection Organization

Walter Kidde & Co., Inc., Belleville, N. J., has published a booklet titled, *Training Your Fire Brigade to Use First-Aid Extinguishers.*

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A low-volume oil spray which effectively controls a destructive 55-year-old banana plant fungus in the tropics, and the technique of applying it, has been developed in a joint research program by Esso Research and Engineering Co. and Esso Standard Oil SA, both affiliates of SONJ. In extensive field tests conducted on the Caribbean island of Jamaica, Esso's new oil fungicide reduced the infection rate to less then 5% from 83% after 2½ months of bi-weekly spraying. Subsequent sprayings assure continued control, with no danger of further "blow ups" of the disease. Shown here are Dr. Norman E. Deifel (left) of Esso Research & Engineering, and Lloyd S. Gregg of Esso Standard Oil SA, which markets oil products in the Caribbean.

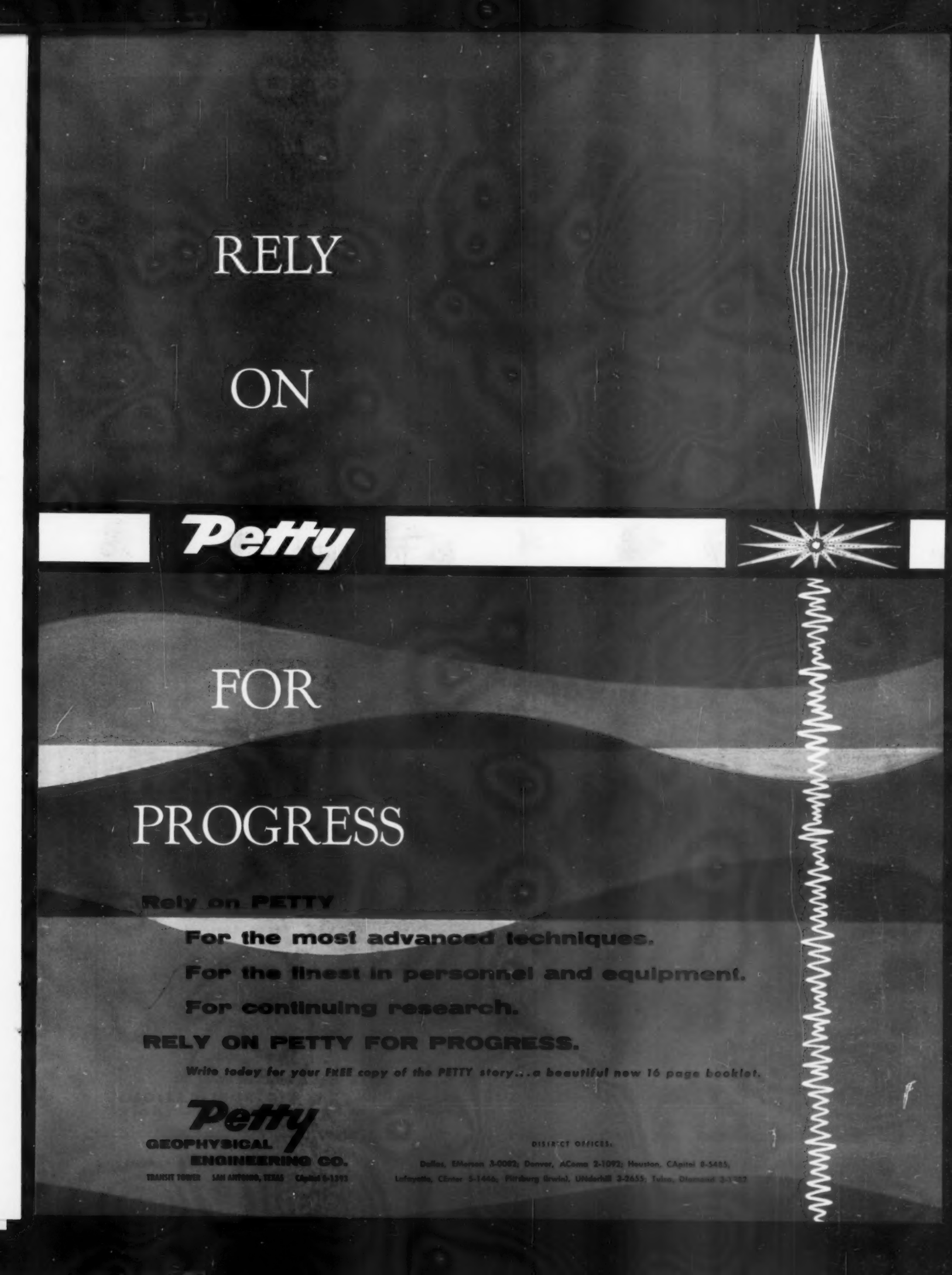
Enap To Expand Concon Refinery

Capacity of Empresa Nacional Del Petroleo's (ENAP) Concon, Chile refinery, will be expanded by 24,000 b/d through the addition of three new units. These will be a 24,000 b/d atmospheric and vacuum distillation unit, a 12,000 b/d Orthoflow fluid cat cracker and gas-recovery unit, a 6,000 b/d cat desulfurization and reforming unit, and a 1,100 b/sd alkylation unit. The boiler plant facilities will be expanded as well. Process mechanical, and design engineering and procurement will be by The M. W. Kellogg Co. Construction will be handled by ENAP, with M. W. Kellogg's subsidiary, Kellogg Pan American, providing supervisory personnel. Initial operation will be under supervision of Kellogg Pan American operating engineers.

Latin America Gets Soviet Offers

To obtain markets for her oil products, USSR has stepped up offers to Argentina, Bolivia, Uruguay, and Brazil. Brazil has been offered oil-field installations and refineries on more advantageous terms than obtainable from western nations. Iran also has been approached. Oil-field equipment works at Bakur are said to have received 275 foreign orders during the first quarter 1958.

First shipment of LPGas produced in Venezuela being loaded at Creole Petroleum Corp.'s La Salina dock, state of Zulia; 11,500 bbl were loaded aboard the motorship "Marian P. Billups" bound for Caribbean markets, where demand for propane and butane gases is growing. These liquefied fuels come from Creole's gas-liquefying plant recently built in Ule, district of Bolivar, in an effort to diversify production of hydrocarbons in Venezuela and to satisfy demand of international markets.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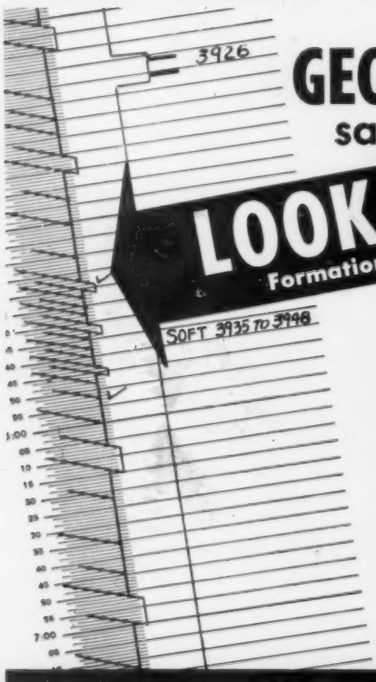

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API Coordinates Affairs

Membership of a new Committee on Public Affairs has been announced by Frank M. Porter, president of the American Petroleum Institute. Formation of the committee was authorized by the Institute's board last November, as part of its long-range plan to consolidate public and governmental relations activities.

Members of the new committee—all on the executive or public-relations-director level—are Thomas W. Phelps, Socony Mobil Oil Co., New York, chairman; Reid Brazell, Leonard Refineries, Alma, Mich.; Hillyer Brown, Standard Oil Co. of California, San Francisco; R. H. Collacott, The Standard Oil Co. (Ohio), Cleveland; Morgan J. Davis, Humble Oil & Refining Co., Houston; Paul Endacott, Phillips Petroleum Co., Bartlesville; C. J. Guzzo, Gulf Oil Corp., Pittsburgh, Pa.; Jake L. Hamon, Dallas; Charles Z. Hardwick, The Ohio Oil Co., Findlay; William F. Kenney, Shell Oil Co., New York; Kerryn King, The Texas Co., New York; Robert H. Scholl, Esso Standard Oil Co., New York; Thomas E. Sunderland, General, Standard Oil Co. (Indiana), Chicago; Henderson Supplee, Jr., The Atlantic Refining Co., Philadelphia, Pa.; Lloyd F. Thanhouser, Continental Oil Co., Houston; Roy J. Thompson, Apex Motor Fuel Co., Chicago; Joseph P. Walsh, Sinclair Oil Corp., New York; Franklyn Waltman, Sun Oil Co., Philadelphia; Burl S. Watson, Cities Service Co., New York.

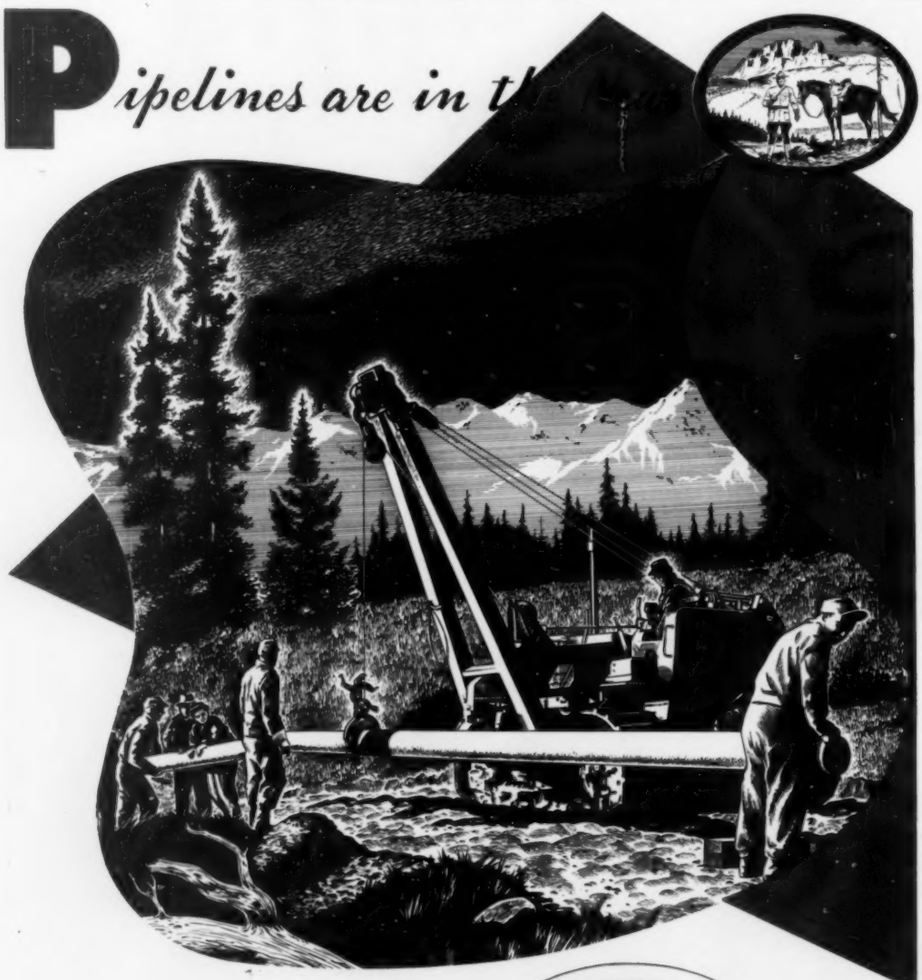
John H. Bivins of the API was named staff director.

It is anticipated the new committee will take over activities of the American Petroleum Industries Committee and the Oil Information Committee of the Institute by September 1—at which time the latter groups will be dissolved.

President Porter noted that "while the committee is new from an organizational standpoint, its basic functions can be traced back to the original charter of the Institute, which was established in 1919." He explained: "For nearly 40 years, while the industry has progressed through an era of dynamic change and technological advance, the Institute has steadfastly devoted itself to furthering the exchange of knowledge between and among the various branches of the industry, and the general public."

Objectives of the new committee, according to President Porter, are: (1) to stimulate the timely dissemination of information concerning the petroleum industry so that public opinion and decisions relating to it will be founded in fact; (2) to develop a climate in which a privately-managed and competitive petroleum industry can best serve the American people and strengthen the national economy; (3) to encourage acceptance by all those engaged in the petroleum industry of their responsibility to assist government at all levels in matters of public interest affecting the industry and its customers.

To assist the new committee in carrying out its assignment, a number of special subcommittees will be established.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Secondary-Recovery Book

Summary of Secondary-Recovery Operations in West Virginia has been published as a pamphlet by the Interstate Oil Compact Commission, Oklahoma City 5, Okla. Data from 55 gas-injection projects, 2 water-floods, and 12 pilot water-floods are included—bringing to January 1, 1957 the data on secondary recovery from the previous 1951 and 1954 reports.

New Petroleum Bibliography

Petroleum Sourcebook—1958, new publication classifying petroleum information by geographic regions, lists some 4,000 information sources covering 82 countries and 82 states, provinces, and geographic regions. More than 500 special publications of value to oil men are classified, as well as the regional material from nearly 100 trade magazines and journals. Compiled from 1,000 pages of literature references issued in 1957 by National Petroleum Bibliography, the book is designed to place in one package the location of petroleum information most often sought by well drillers, geologists, petroleum engineers, executives, and researchers.

The 188-page source book, priced at $6.00 per copy, may be ordered from the publisher, National Petroleum Bibliography, Box 3586, Amarillo, Texas.

1958 safety honor for USA tankers has been awarded to The Atlantic Refining Co.'s oil tanker, SS "Atlantic Engineer," by the American Merchant Marine Inst. and the National Safety Council's marine section. In the photo are Rear Admiral Henry T. Jewell (left), chief of merchant marine safety, USA Coast Guard, presenting the safety pennant to Harry G. Schad, vice president and general manager of Atlantic's transportation department. Known as the "Ship Safety Achievement Award," the citation was presented for the "Engineer's" night rescue last year of a family of six from a sinking catamaran, 25 miles off the coast of Florida.

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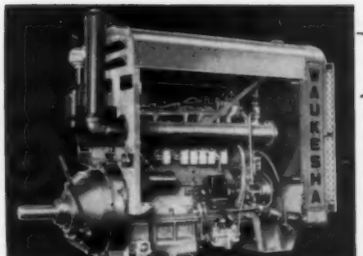

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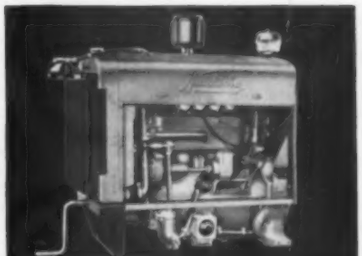

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INTERNATIONAL NEWS AND NOTES

"Ragusa" Launched In Netherlands

The 31,000 dwt turbine tanker "Ragusa" was launched for a subsidiary of the Gulf Oil Corp. at the yard of the Netherlands Dock and Shipbuilding Co. in Amsterdam, June 6, by Mrs. Gregersen, wife of Albert Gregersen, vice president of the Gulf Eastern Co., London.

For some time Gulf has named certain of its new tankers after oil fields. The name "Ragusa" hence recognizes one of the newest and largest oil fields in Europe outside the Iron Curtain. The field is situated in the southeast of Sicily, close to the town after which it is named.

A delegation of prominent Sicilians, headed by the Honorable Giuseppe Alessi, president of the Sicilian parliament, attended the launching. Also Professor Carmela Pisana the mayor of Ragusa was present.

The launching of the tanker "Ragusa" represents the latest in a series of additions of Gulf's tanker fleet, and is a part of its large tanker-building program in the United Kingdom on the continent and in Scandinavia.

Middle East Representative

Fahmi N. Dahdah, a Jordanian who recently joined Tretolite Co. division of Petrolite Corp., St. Louis, has been appointed representative for Tretolite in the Middle East oil-producing countries. He will serve as engineer on the company's overseas staff, and will be headquartered at Al Kuwait, Kuwait, on the Persian Gulf.

Peru Reports For 1957

Crude production in Peru came to a record of more than 19,200,000 bbl (52,602 b/d) last year, a gain of 4.4% over a year earlier. Some 780,000 bbl came from the Ganso Azul—nearly double the 1956 total of 396,000 bbl. Bulk of the production was from fields in the northwestern area, where production was 18,441,181 bbl. A year earlier, it was 17,987,405 bbl.

Exploratory wells last year totaled 16, compared with 31 in 1956 and 24 in 1955. Half were successful, compared to 25% in 1956 and 29% in 1955. Last year, eight found oil and eight were dry.

Development wells came to 145 last year, compared to 169 in 1956 and 167 in 1955. Nearly 90% were successful compared to 86.4% in 1956 and 77.8% in 1955. Some 130 found oil, and 15 were dry holes last year.

Exports of crude last year were 3,295,194 bbl compared with 2,768,734 bbl in 1956.

Imports (barrels) were: avgas, 610,113; residual, 1,575,859; lubricants, 108,629.

Mexico May Ban Imports

Petroleos Mexicanos officials say they plan to forbid imports of gasoline from USA to Baja California this year. First target date for the ban was June 1958.

Pemex is erecting a petroleum products storage depot at Ensenada. Products will come by tanker. Trucks will carry products from depot to points such as Tijuana, Tecate, and Mexicali. Gasoline dealers, serving the area with USA gasolines, have been protesting. There were 47,027,386 gal of American gasoline in the area, at .06¢ per gal beproducts imported through Tijuana during 1957.

Mexican businessmen also note that sales of American gasoline in the area at .06¢ per gal below prices in the USA because of tax laws, has attracted tourists from southern California. Concern has been expressed whether Pemex will be able to supply the area and the service stations with the quantity and quality of gasoline needed at comparable prices.

Tapline Sidon Deliveries Up

Tapline delivered from Sidon, Lebanon, during February 1958 totaled 10,281,084 bbl; average of 367,182 b/d. This compares with 9,321,700 bbl (332,-918 b/d) same period last year. During the first two months of 1958, Tapline delivered 19,380,939 bbl of crude (328,490 b/d). This compares with 18,867,713 bbl (319,792 b/d) during the same period last year.

An oil exploration permit covering some 11,000 square miles in the west central part of Tunisia in North Africa has been granted Conorada Petroleum Corp. Shown signing the agreement are (left to right) W. F. Penniman, Conorada vice president; Hedi Nouira, Tunisian Secretary of State for Finance; and Azedine Abassi, Tunisian Secretary of State for Commerce and Industry. Standing are Mr. Larram and Mr. Fourati, members of the Tunisian government staff. Under the terms, Conorada has agreed to spend $4 million in the next five years in search of oil in west central Tunisia. Conorada is the first American oil company to enter Tunisia since it became independent last year. Only oil company now active in the country is a joint French-Tunisian concern.

Qatar Exports 6.4 Million Tons

Crude exports from Qatar during 1957 came to 6,448,352 long tons. No crude was produced on the Trucial Coast during the year.

Soviet Gas Output To Rise

Proved gas deposits are 160; under exploitation about 50. In 1958 gas production is to rise to 1,095.6 billion cubic feet—50% over 1957.

Laying of 232-mile gas line from Shkapovo (Bashkiria) to metallurgical works in Magnitogorsk (Urals) has begun. Stavropol section of 2nd Stavropol-Moscow gas line has been completed. Stavropol region is to increase gas production in 1965 to 511.9 billion cubic feet from 63.5 billion in 1958.

Socal In British Guiana

Standard Oil Co. (Calif.), through subsidiaries, has agreed to invest at least US $200,000 in exploration in the next two years under terms of its new agreement with British Guiana. Area covered is offshore land plus a narrow strip of the coastlands.

The California Oil Co. (British Guiana) Ltd., capitalized at BWI $850,000, also has agreed to construct a refinery of at least 100,000 tons a year capacity if production reaches at least 200,000 tons of crude a year.

Total payments to British Guiana will be less than 50% of net profits. The government is to benefit from the 45% income tax on corporations and a small royalty. Final agreement provides for a 20% annual depletion allowance.

Company plans to start exploration before the end of 1958, beginning with a comprehensive seismic survey of the continental shelf in the uncovered area. The agreement will test the mineral resources of the country, but company officials apparently plan a "minimum" investment at first, and do not express widespread optimism.

Libyan Aerial Surveying

Two new air surveys of 60,000 square miles in Libya for Pan American International Oil Co., Mobil Oil Co. of Canada Ltd., and Oasis Oil Co. of Libya began in May. Aero Service Corp., Philadelphia, is performing the surveys. First project calls for high-altitude aerial photography of 28,000 square miles of new concessions in the Sahara desert for Mobil and Oasis. Oasis is a wholly owned subsidiary of the Ohio Oil Co. and operator of concessions in Libya for Amerada Petroleum Corp. of Libya and Continental Oil Co. of Libya.

Second survey, for Pan American International, involves aerial photography and an airborne magnetometer survey of 32,000 square miles of the company's new concessions in southern Libya.

N. F. Myers

Esso's New Norway Refinery

The new refining affiliate of Standard Oil Co. (N.J.) in Norway, A/S Esso Raffineriet Norge, has announced that Norval F. Myers will become chairman and managing director, and Gustav A. Stein, Jr., will become a member of the board and managing director. The new affiliate, with headquarters in Oslo, has been formed to supervise the planning, construction, and operation of what will be Norway's largest refinery.

Mr. Myers joined Esso Research & Engineering in 1941, after 16 years' experience as a research chemist-engineer and in various refinery management capacities. Since 1953, he has been deputy refining coordinator for Jersey Standard. Prior to that, he was a managing director of Esso Petroleum Co. Ltd., with which he had been associated four years. During that time he participated in the building and expansion of the company's refinery at Fawley, England.

Mr. Stein, who has been a managing director of Esso Belgium, began with Jersey Standard in 1927. He became technical advisor to its Denmark affiliates; then supervised refinery and chemical operations at Esso's Baton Rouge, La., refinery. In 1955, after assistance with the startup of a Venezuela plant, he became manager of the Esso refinery at Antwerp, Belgium, and became managing director of Jersey's Belgian affiliate a year later.

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That's why Dowell has developed eight basic fracturing services—each for a specific purpose in stimulating well production. Also, numerous chemical additives have broadened the range of these *basic* treatments to make them even more effective in widely-varying formations.

But Dowell is not stopping here. Still better materials, techniques and equipment are being developed by Dowell's field and laboratory research groups. The Dowell organization—chemists, engineers, field personnel—is a team you can count on to help you unlock *your* formation. Dowell, Tulsa 1, Oklahoma.

*Dowell Service Mark

Services for the oil industry DOWELL

A SERVICE DIVISION OF THE DOW CHEMICAL COMPANY

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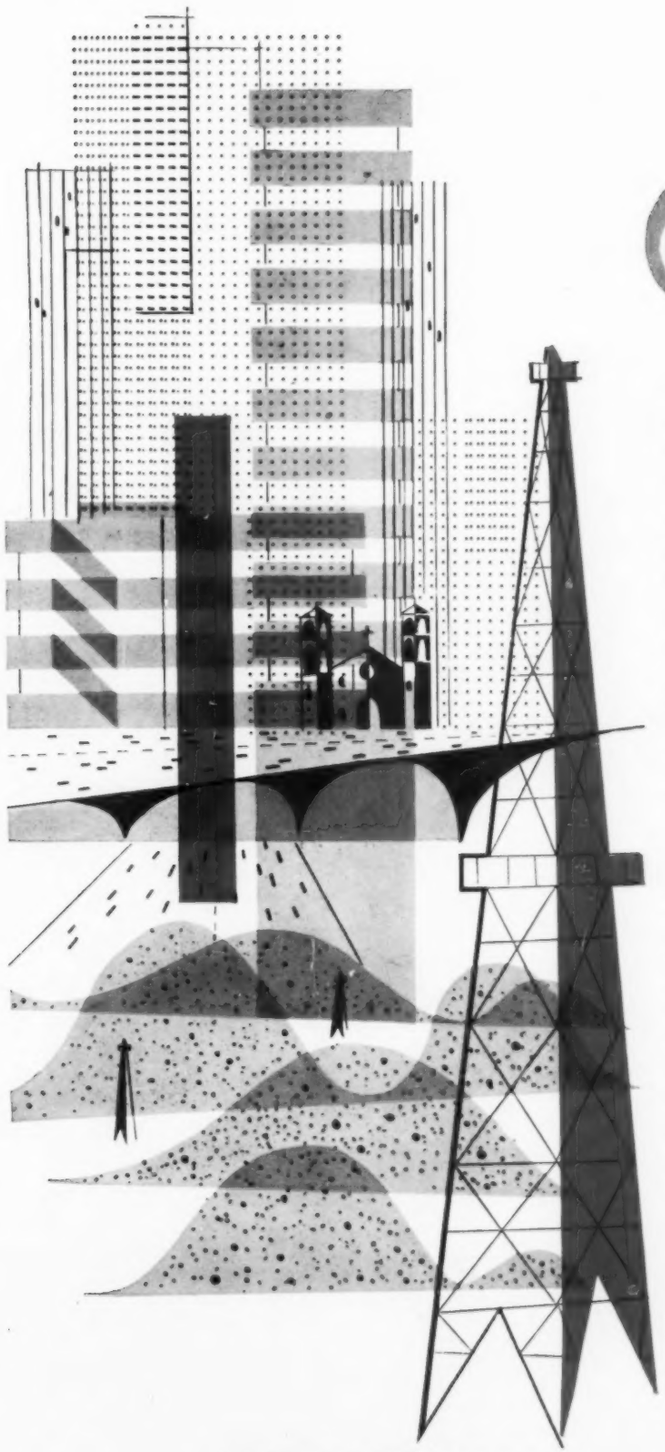

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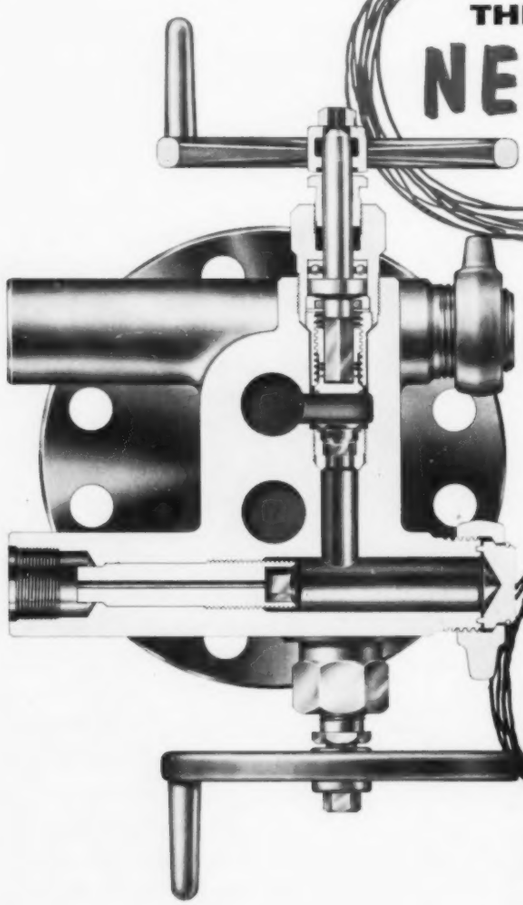

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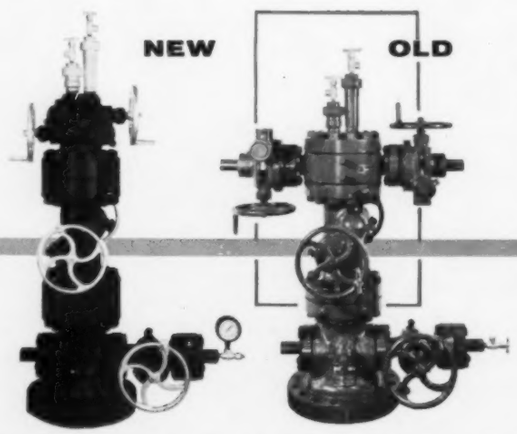
• Ask your O-C-T Representative or write for complete information.



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